FEBRUARY 4, 1952 NEWS ISSUE

Electrical World

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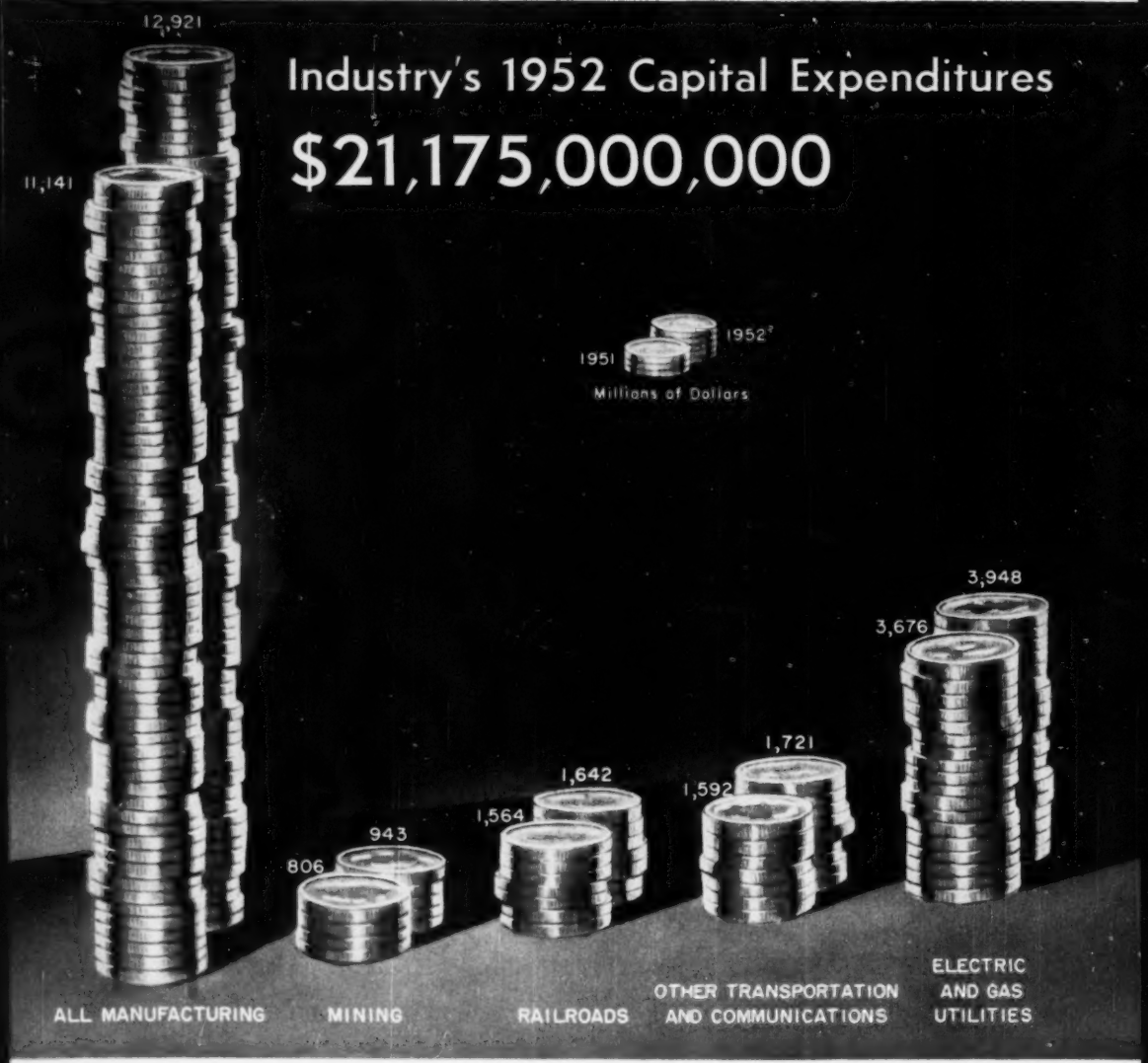
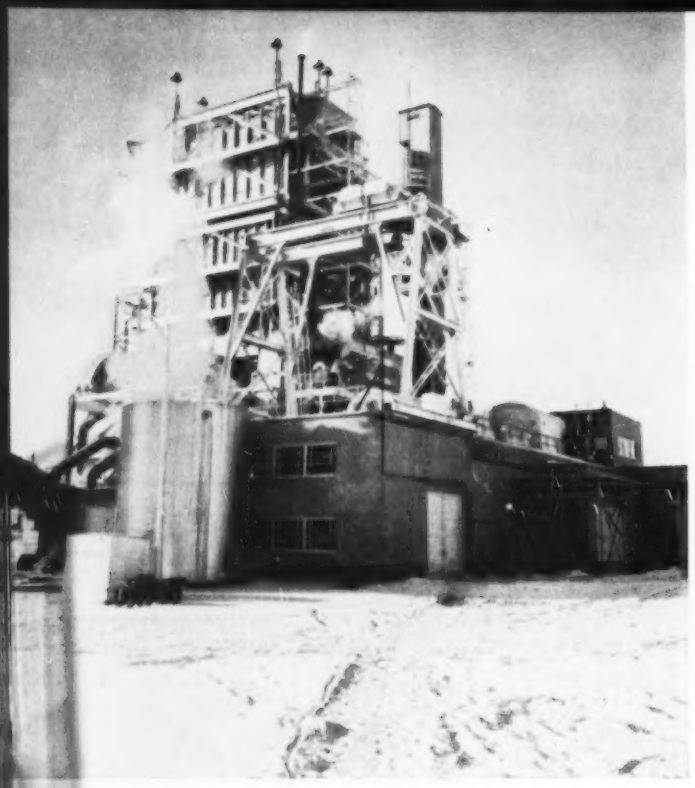


Business Will Be Good in 1952 . . . Page 7

It Takes Time to Make a Turbine-Generator . . . Page 22

Montana Power Co. shaves station cost to $86.83 per kw



Low cost plant for operation at 40 below may start increased trend to outdoor station planning in northern regions

To an industry profoundly conscious of material shortages and rising costs of construction, the new Frank Bird steam plant of The Montana Power Company offers a striking demonstration of the material and cost saving possibilities of outdoor station design.

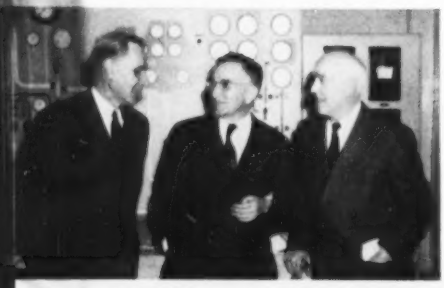
Built at about half the average cost per kilowatt of more conventional stations, the plant is particularly noteworthy because it is the first of its type to be constructed for operation under conditions where extreme winter temperatures may dip to −40 F. The only steam station operated by The Montana Power Company, it is designed to firm up the hydro-electric system during periods of low stream flow. Special provision has been made to protect equipment against cold when plant is shut down.

Here is yet another example of the continuing efforts of the electric utility industry to supply more and more low cost electric power in face of today's rising costs. It may well set a new pattern for many future utility expansion plans. *General Electric Co., Schenectady 5, N. Y.*

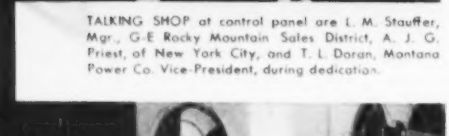
MORE POWER TO AMERICA

GENERAL ELECTRIC

S21-184

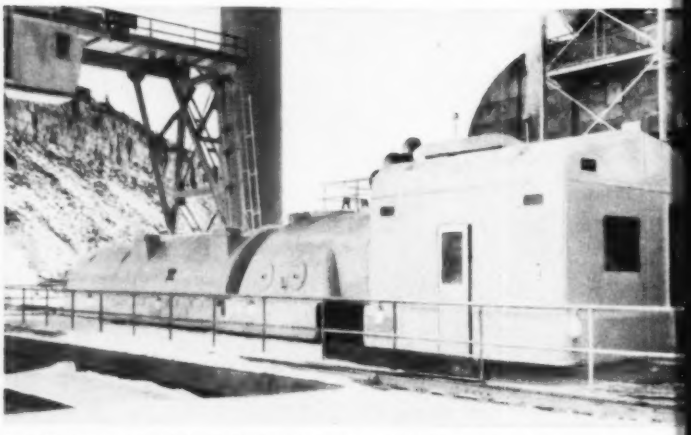


FARTHEST NORTH semi-outdoor station operates in blanket of Montana snow. G-E turbine-generator may be seen on top of building in foreground, overshadowed by towering outdoor boiler, 132 feet high. Plant was designed and constructed by Ebasco Services, Inc., and is located near Billings, Mont. Designed to use either oil or gas.



TALKING SHOP at control panel are L. M. Stauffer, Mgr., G-E Rocky Mountain Sales District, A. J. G. Priest, of New York City, and T. L. Doran, Montana Power Co. Vice-President, during dedication.

82,500 KVA G-E TRANSFORMER forms background as Frank W. Bird, Montana Power Co. President, W. L. Murphy, Director, and J. E. Corette Jr., Vice-President, talk with G. M. Gadsby, (holding booklet), President of Utah Power & Light Co., and EEI.



G-E "PREFERRED STANDARD" TURBINE GENERATOR, rated 66,000 kw capability is exposed to −40 F Montana winter. Generator is protected by special cork wrapping. Walk-in housing shown at high-pressure end of turbine is for protection of operating personnel. Similar shelter is used at exciter end. Generator hydrogen system circulates warm water during winter shutdowns. Turbine is rated 850 psig, 900 F.

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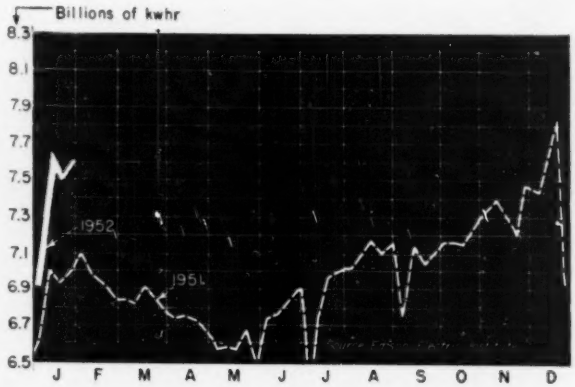
Electrical World



Output Week Ended Jan. 26—7,616,421,000 Kwhr

Per Cent Change From Previous Year

	Total US	New End.	Mid Atlan.	Cent Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
Jan. 26	+9.3	+6.2	+6.7	+6.8	+9.9	+10.8	+19.2	+10.9	+11.3	+12.1
Jan. 19	+9.1	+6.1	+7.1	+6.5	+8.3	+10.1	+20.5	+10.2	+11.4	+12.0
Jan. 12	+9.8	+6.4	+7.6	+7.2	+8.8	+11.5	+19.5	+10.6	+11.7	+13.5

Electric Power Statistics

		Latest Month	Preceding Month	Year Ago
Peak Load—Class I Utilities (Million Kw)	Nov.	66.00*	63.37	60.03
Capacity (Million Kw)	Nov.	75.18	74.68	67.98
Production (Billion Kwhr)	Nov.	32.10	32.44	29.02
Hydro		8.08	7.55	7.67
Fuel		24.02	24.89	21.35
Sales (Billion Kwhr)	Nov.	27.92	27.68	25.39
Residential		7.37	6.85	6.41
Commercial		4.68	4.65	4.21
Industrial		13.89	14.13	13.00
Other		1.97	2.05	1.82
Fuel Consumption				
Coal (Million Tons)	Nov.	9.72	9.58	8.76
Oil (Million Barrels)		5.95	5.44	6.20
Gas (Billion Cu Ft)		53.70	72.00	47.76
Net Income Class A & B Utilities ($ Million)	Nov.	70.81	54.02	65.27
Dec. 52 Peak Class I Utilities(Million Kw)*	Oct.	77.4	77.2	69.6
Kwhr per Residential Customer (12 Month Average)	Oct.	1,972	1,961	1,801
Revenue per Kwhr Residential Service (12 Month Average)	Oct.	2.83¢	2.83¢	2.90¢
Canadian Production (Billion Kwhr)	Nov.	4.94	4.92	4.46

Business Statistics

FRB Industrial Production Index†††	Dec.	216*	219*	216
Gross National Product ($ Billion)	3rd Qtr.	81.7	79.1	72.4
EW 5 Industry Production Index	Dec.	124.0*	123.4*	120.3
ENR Construction Cost Index††	Jan.	114.8	114.8	111.3
BLS Consumer's Price Index	Nov.	188.6	187.4	176.4
NEMA Insulation Materials Sales Index†	Nov.	511	559	542
NEMA Electric Appliance Sales Index (Unadjusted)	Nov.	269	305	367
NEMA Household Refrig. Sales Index†.	Nov.	87.7	113	228

*Estimated †1936 = 100 ††1949 = 100 †††1937-39 = 100 (Unadjusted)

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Look closely at the jumpers on this strain tower... No splices! Conductor cable runs straight through without resorting to parallel jaw clamps to carry current and, eventually, to make trouble.

Construction like this is possible with O-B Hi-Lite strain clamps. It's easy to build, easy to inspect for soundness at any time, easy to keep in top condition. No special equipment, tools, or skills are required to install O-B Hi-Lites. A minute or two with a standard wrench and they're ready to serve the life of the line. Basically low in first cost, the O-B Hi-Lite installs at an attractive over-all saving.

Just add up these factors: Design that permits the use of continuous jumpers--convenience--high maintained holding power--positive inspection for soundness at any time--low installed cost--availability in either ferrous or non-magnetic, non-heating alloys. Don't you agree it's worth your time to investigate O-B Hi-Lite strain clamps?

Ohio Brass

MANSFIELD - OHIO

4110-H

THE ELECTRICAL WEEK

Featured In This Issue

Business will be good in 1952, Fifth Annual McGraw-Hill Economic Survey indicates (p 7) . . . Five companies have been selected to compete for the **Coffin Award** (p 9) . . . Reclamation, entering its 50th year, is proud of its power record (p 15) . . . In the **West Coast** power dam battle, the fish get taken for a ride (p 16) . . . Generator manufacturing is a long lead-time affair (p 22) . . . **Standardization** of equipment is saving money for the industry, ASA survey reveals (p 32) . . . Loading the banks with boulders will solve a major problem at **Grand Coulee,** BPA hopes (p 34) . . . Contests spark appliance sales (p 35) . . . GE sets up a microwave system (p 41) . . . **Utility bond yields** were on the rise as 1951 ended (p 46) . . . DPA issues a certificate of necessity for **Pelton Dam** project on the Deshutes, and is met immediately with opposition from the area's fish and game groups (p 48) . . . **Construction** will continue at near-record levels in 1952 (p 50).

• • •

Washington—President Truman has been asked to help find some way around the voluntary credit restraint policy which is interfering with sale of Puget Sound Power & Light to public bodies. The policy is also a factor in proposed sale of Washington Water Power . . . Hearing will begin April 8 before FPC on four applications to bring natural gas to Pacific Northwest . . . FPC has issued a 50-year license to Connecticut River Power for its 15-mile Falls project, which includes two existing and one proposed development . . . AEC will need an additional 7,000 engineers and scientists if its proposed expansion program is approved by Congress . . . Publications Section, FPC, Washington 25, D. C., publishes fifth annual edition of "Statistics of 915 Publicly Owned Electric Utilities" (order # FPC S-95) at $2 per copy.

Missouri River States Committee approves a special committee made up of basin state governors and their resources development advisers, consisting of James M. Landis, former dean of Harvard Law School; former Gov. Phil M. Donnelly of Missouri; and Clifford H. Stone, director of Colorado Water Conservation Board. They will work on the draft of an interstate compact for ten Missouri River Valley states and federal compact for unified management of water, soil, and related resources of the basin. Committee hopes to present the compact draft to States Committee before July 1.

City Council at Tacoma, Wash., passes an ordinance extending regulatory powers of Public Utilities Department over small industrial customers and their power service facilities as requested by Utilities Commissioner C. A. Erdahl.

Tacoma, Wash., will begin new billing basis on April 1 under which light bill of a domestic user between April and September will be at least 65% of highest bill between October and April. This is expected to raise bills of 18,610 customers an average of $2.83 a year. A $1-minimum previously applied.

To save time and reduce costs at commission hearings, New England Telephone & Telegraph Co has just filed sworn testimony statements of 16 witnesses in its pending rate case before New Hampshire PSC. Lengthy oral proceedings thus should be curtailed.

In first time in 40-year history, Empire District Electric Co asks public service commissions of Missouri, Kansas, Arkansas and Oklahoma for general rate increase of about 14%. This would up gross sales about $800,000 annually.

Load pickup on a new 186,000-hp wind tunnel drive being installed by National Advisory Committee for Aeronautics at Ames Aeronautical Laboratory, south of San Francisco, will be limited to 12,000-hp a minute, under terms of power contract being negotiated with Pacific Gas & Electric Co.

Fuel oil for Southern California Edison's new 200-MW Etiwanda plant will be transported 39½ miles from Los Angeles area by pipeline stations on the line which will be attended around the clock.

Financing—Northern Indiana Public Service asks PSC approval to issue $10 million first mortgage bonds . . . Kansas City Power & Light will merge the physical properties of Eastern Kansas Utilities Co into it with the exception of the southern properties which will be sold outright to Kansas Gas & Electric.

Kentucky Appellate Court upholds PSC's order allowing Kentucky & West Virginia Power Co to serve two Perry County coal mines on separate meters. In 1945, when material and equipment were difficult to obtain, the company began serving Marlowe Coal Co and Stoker Coal Co through one meter although the mines were half a mile apart. On Dec. 12, 1948 the company decided on separate meters. In upholding the commission's order Judge Brady M. Stewart said that the record showed that the two mines had a combined savings of over $11,000 annually by the combined meter method, and if such practices were permitted to spread, it "would tend to destroy rate standards."

Congratulations—Rockland Light & Power Co elects Fremont L. Lovett, formerly vice president and general manager, president, succeeding Rockwell C. Tenney who becomes board chairman . . . Iowa Utilities Association elects Sutherland C. Dows, president of Iowa Electric Light & Power Co, president . . . Consumers Power Co, Jackson, Mich., elects Robert P. Briggs, formerly financial vice president, executive vice president and also names H. Stanley Richmond and Donald E. Herringshaw vice presidents . . . S. L. Drumm, vice president in charge of sales, New Orleans Public Service Inc, is elected chairman of the Better Light Better Sight Bureau.

THE ELECTRICAL WEEK

CONTINUED

The U. S. Ninth Circuit Court of Appeals at San Francisco has restrained SEC from taking any action on proposed sale of Washington Water Power to three PUD's. They claimed SEC "has no jurisdiction over a holding company transaction with any public body." Without waiting for official notification SEC called off a hearing scheduled for Jan. 28. It is considering its next move while awaiting further order of the court which has not set any date for further court hearings.

Public Service Co of Northern Illinois is experimenting with the use of radar to track sleet storms.

Proposal that the town of Mountain Home purchase the distribution facilities of Arkansas Power & Light was defeated, 330 to 275 at a recent special election.

Columbus & Southern Ohio Electric has asked PUC for approval to increase industrial, large commercial light and power rates by $1,625,000 annually which will add about $694,000 to net income . . . Northern States Power Co, Minneapolis, is increasing rates about $5 million annually or about 7% of 1951 sales. The increase goes into effect in March.

Last week, Union Electric of Missouri announced it is re-entering merchandising field. Reason—low saturation.

IN THE INDUSTRY

Charles E. Wilson, the nation's top defense mobilizer and former president of General Electric Co, has always been noted for his honesty and frankness. That his 18 months plus in Washington haven't changed him is evident from his testimony recently before the Joint Committee on the Economic Report. The industry will be interested in this discussion with the committee chairman, Sen Joseph C. O'Mahoney, Wyoming Democrat:

Chairman: Do you regard all of these objectives (the addition of 30 million kw of generating capacity by the end of 1953) as essential objectives?
Mr Wilson: Yes, I think so.
Chairman: The production of power is essential?
Mr Wilson: Oh, by all means.
Chairman: Does that goal include the St. Lawrence seaway?
Mr Wilson: It does not, senator.
Chairman: Have you any opinion with respect to that power development?
Mr Wilson: As a power development, no, I have not any . . . I do not think the essentiality of the use of the hydropower from that part of the country is nearly as important as the use of the seaway for bringing in iron ore.
Rep Patman of Texas: Although you do not approve of that particular project, you are not against the development of these hydroelectric power projects, generally, where they are feasible and practicable.
Mr Wilson: No, I am not against them. I am against them as public projects, yes, because I still believe in the free enterprise system. I think it is what made us what we are today. And I think that is pretty good. I hate to see us weaken it by trying to be half socialist and half free enterprise.
Rep Patman: You will not get any argument out of me on that.
Mr Wilson: Good!

After some discussion Rep Patton asked Mr Wilson this question, "Do you not think that we should, in order to have maximum strength for the future, we should as quickly as possible try to develop all those (multipurpose) projects in our country?"

Mr. Wilson: I think we ought to develop any projects that are a combination of flood control and save the water against the day you want to use it for the benefit of the nation, yes. Power, yes, if it is really economical and if it is in the locations where we really need it. But I think we fool ourselves a great deal, you know, by spending vast sums of the taxpayers' money to build a lot of power dams in one particular section of the country. And then because we have it, stick a lot of production up there that certainly does not belong in that part of the country just because you can get 2-mill power, which the taxpayer is really paying for, you know. But you can get 2-mill power to make, let us say, aluminum. I personally think that is the bunk. I think we are just fooling ourselves.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Apparatus clearances are occasionally inadequate for making such checks as phase rotation after a disrupted circuit has been repaired.

Lightning outages on 230 kv are 80 to 85% from strikes to conductors and 15 to 20% to towers. The latter can be reduced by high insulation levels and low tower-footing resistances.

Thermal agitation accounts for the background noise commonly emanating from resistors used in communication; in the case of varistors the phenomenon is less at higher frequencies.

Varistors in series (like resistors) must have approximately identical characteristics if they are to divide the reverse voltage proportionately.

Silicone resin graduations on glass last longer; at least they do on clinical thermometers washed in soap and dipped in strong disinfectants.

Relays are available to trip street lighting circuits that have been accidentally disrupted.

Spreader stokers are reportedly capable of burning low quality bituminous effectively and efficiently, even at high rates of heat release.

Third circuit out of a growing substation will hardly add what it should if the first two have not been separated well enough so that either can be worked on without de-energizing the second for purpose of safety.

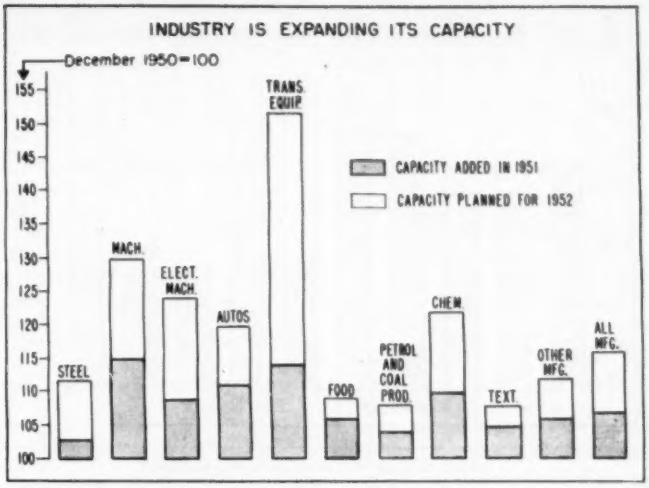
Business Will Be Good in 1952

Industries will continue to expand and modernize their facilities at a high rate

(See Front Cover)

Industry will invest more in new plants and equipment in 1952 than ever before. Total expenditures—in manufacturing, mining, transportation, and utilities—will run 13% ahead of 1951. That's what companies intend, according to the fifth annual survey of spending plans conducted by the McGraw-Hill Department of Economics. The survey asked companies how much they plan to invest this year, and how much more in 1952-55, if business stays reasonably good.

Manufacturing industries—utilities' biggest customer—will put 16% more into new facilities this year than last. In other words, the rush to build that started after Korea isn't over by a long shot.



Business Capital Expenditures (Millions of Dollars)

	Actual 1951*	Planned 1952	Preliminary Plans 1953	1954	1955
Steel	1,310	1,638	1,048	934	901
Machinery	638	636	443	424	414
Electrical Machinery	355	809	712	372	299
Autos (including defense)	797	781	406	297	289
Transport Equipment	227	404	145	40	40
Food	930	769	710	816	754
Petroleum and Coal Products	2,040	2,815	2,477	2,111	2,055
Chemicals	1,266	1,464	1,323	1,191	1,179
Textiles	676	396	396	383	394
Other Manufacturing	2,902	3,909	2,368	1,957	1,869
All Manufacturing	**11,141**	**13,921**	**10,088**	**8,525**	**8,194**
Mining	806	943	415	321	358
Railroads	1,564	1,642	1,248	1,117	1,002
Electric and Gas Utilities**	3,676	3,948	3,360	3,204	2,748
Other Transportation and Communications	1,592	1,721	1,671	1,943	1,839
All Industry	**18,779**	**21,175**	**16,782**	**15,110**	**14,141**

*U. S. Dept. of Commerce.
**Electrical World, American Gas Assn.

Chemical Industry Plans Far Ahead . . . In the metalworking industries, a lot of the new construction has been completed. And it's a matter of getting equipment installed this year. But the petroleum refinery program is just starting to move. It won't hit full stride till later in 1952. And most of the new refining capacity will come in during 1953. The chemical industry has plans which run as far ahead as 1955 for erecting many new plants, some of them very large.

In fact, it's surprising how much new industrial plant is on the drawing boards for years after 1952—after all the talk about over-building capacity. Industry's present plans for 1955 (table) already add up to more than was spent in 1950 or any other year prior to 1951.

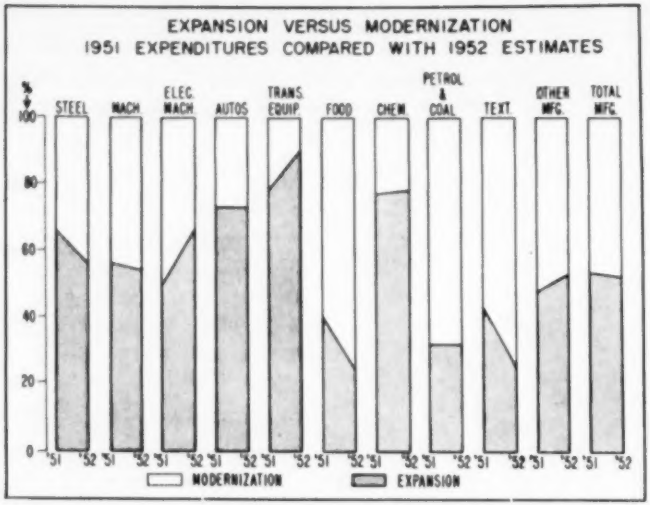
Future Plans Will Grow . . . The figures show quite a drop from 1952. But this always happens when you ask companies to project into the future. If companies add projects as time passes—that's what normally happens—plant and equipment expenditures may level off below this year's record total, but within 10 to 15% of what was spent last year.

These are only plans, of course. They may not be realized. But you get an idea of the potential which the future may hold. And the survey certainly knocks out any idea that new plant construction is going to dry up in a hurry once mobilization is over.

Electro-chemical and electro-metallurgical industries are among those with the biggest plans for new plant, both in 1952 and in succeeding years. The chemical industry plans another 4 years of $1 billion-plus spending on new facilities. Expenditures on petroleum refineries will double this year, stay high for as long as now foreseeable. (Incidentally, in 1952, the oil industry—including production, transportation and marketing facilities, as well as refining—will be the biggest single (private) industry in terms of capital investment: $2.8 billion. In every other year from 1951 through 1955, it will be the private electric utilities.) Expenditures by the nonferrous metals companies are going up over 60% this year, mostly to build new aluminum plants.

All these are dollar figures. So they don't tell too clearly how much physical plant—how much power-using equipment is going into place. But the McGraw-Hill survey also came up with figures on capacity in manufacturing industries which do make it clear what's happening.

More Manufacturing Plant . . . By the end of 1952, manufacturing industry will have 16% more capacity than it did in 1950 (chart). A lot of the in-



What's Behind 1953-1955 Investment Plans?

Percent of companies saying:

	More Capacity for present products	Capacity for new products	Plants to serve new market areas	Replacement and modernization
Steel	38	..	..	88
Machinery	39	31	4	87
Electrical Machinery	57	71	14	100
Autos	67	33	33	83
Transport Equipment	57	43	14	71
Food	50	21	17	88
Chemicals	60	60	27	47
Textiles	16	26	5	89
Other Manufacturing	49	38	11	91
All Manufacturing	48	33	13	83

crease is in the metalworking industries which are in the thick of the defense effort—machinery, automotive, and transportation equipment all to be up over 20%. Steel is aiming at a 12% boost in capacity over 1950. There'll be 22% more capacity to make chemicals. The big additions to petroleum refining capacity won't show up until 1953, but by then they'll match most other industries.

Electrical machinery companies will be able to turn out one-fourth more by the end of 1952 than they could in 1950. There are no figures from the survey on capacity in the aluminum or atomic energy fields—two of the big post-Korea developments—but you can bet the increases will be terrific.

After '52 Modernization . . . After 1952—except in the petroleum, chemical and light metal industries,—manufacturers plan to concentrate on modernization and replacement of equipment more than on expansion. Eight out of ten companies answering the McGraw-Hill survey stressed modernization as their primary aim after the defense effort tapers off.

But it won't be modernization exclusively. Most companies have some plans for continued additions to capacity—either to make present products or for entirely new products. Chemical, auto, and electrical machinery makers are most interested in adding capacity for their present lines. In the chemical and electrical machinery fields most companies also have substantial plans for plants to make new products.

Manufacturers' plans to change plant locations and build in new areas are of special interest to electric utilities. There's a lot of this going on right now. For example, the auto industry is building defense plants on the East Coast and in the Southwest which could be auto assembly plants some day. The steel industry is getting more of its capacity located near seaboard,—east, south and west. The Southwest is getting chemical plants.

Only 13% of all manufacturers in the McGraw-Hill survey said their plans for *after* mobilization included new market areas. But in auto, food, and chemical industries, the percentage is much higher than that. A third of the automobile companies, and more than a fourth of the chemical companies are going into new areas after 1952. And this could have quite an effect on the regional power picture.

•

Reynolds Starts . . .

. . . aluminum facilities in Arkansas as result of 3-way pact with SPA and AP&L

Reynolds Metals Corp will start work immediately on a 55,000-ton annual capacity addition to its primary aluminum plant in Arkansas as a result of a 30-year power agreement signed in Washington last week by the corporation, Arkansas Power & Light Co, and Department of Interior.

AP&L agreed to supply 110,000 kw of continuous power beginning January 1953, and Interior, through Southwestern Power Administration, agreed to furnish 150,000 kw of hydro power during certain hours each day.

The agreement came after extensive negotiation. Reynolds at one point threatened to shift the installation to Texas if no firm power accord could be reached. Gov Sidney S. McMath in turn threatened to set up an Arkansas Power Authority to supply the power and induce Reynolds to build in the state.

Chief stumbling block in the negotiations was a proposal that SPA rates be reviewed for increase every ten years. This was opposed by both AP&L and Reynolds. As finally worked out, the two private companies agreed to pay SPA 5% more for the power each decade, splitting the additional cost between them. Interior originally proposed a 7½% increase each decade.

These were base rates of compensation to the government:

First ten years—6 mills per kwhr for first 22 million kwhr, 3 mills for remaining 8 million kwhr each month.

Second ten years—6.3 mills per kwhr for first 22 million, 3.15 for remaining 8 million.

Third ten years—6.615 mills per kwhr for first 22 million, 3.3075 for remaining 8 million.

5 Utilities Picked to Compete . . .

. . . for Coffin Award. Review Committee asks selected companies to submit presentations for industry honor

The field for selecting the Coffin Award winner for 1951 has been narrowed down from 39 candidates to five. The award is made for the accomplishment of greatest importance to the public and the industry during the year.

The Coffin Award Review Committee, which met in New York recently, has asked Cleveland Electric Illuminating Co, Consumers Power Co, Ohio Edison Co, Pacific Gas & Electric Co, and Pennsylvania Power & Light Co to submit presentations in competition for the award.

Reasons for nominating these companies were listed by the committee as follows:

Cleveland Electric—For its program of cost analysis and cost reduction by such means as work simplification and mechanization assuring customers of continued good service at low cost and making the CEI service area attractive to new industries.

Consumers Power—For execution of advanced engineering concepts making possible continuing operating economies beneficial to the public, insuring success of the farm electrification program, and enhancing community and employee relations.

Ohio Edison—For unification of its organization and system facilities with those of Ohio Public Service Co to benefit consumers, investors, and employees.

Pacific Gas & Electric—For meeting the needs of one of the nation's most rapidly expanding regions with the largest privately financed construction program ever undertaken in the industry and for resolving its problems of government competition with a program of cooperation.

Pennsylvania Power & Light—For developing sales programs aimed at enhancing customer appreciation and utilization of electric power, for building better customer and intra-industry relations, and for promoting the American system of free enterprise.

Questioned on the absence of Electric Energy, Inc, from the list of nominees for the award, a spokesman said that while the committee considered EE, Inc, a great achievement, it could not qualify for the award since it was not an operating company.

JAY GOLD in the driver's seat of his Sno-Cat

Posthumous Medal to Streamliner Hero

A 33-year-old employee of Pacific Gas & Electric Co who died Jan. 21 from overexertion after working three days and two nights to rescue 226 passengers on the marooned streamliner "City of San Francisco" will receive the company's highest decoration for courage, the John A. Brittón gold medal.

The employee, Jay Gold, drove a snow tractor for the PG&E line crew that worked in heavy snow and wind to deliver 400 lb of food and medical supplies to the passengers stranded in the Sierra storm. Although suffering from high blood pressure, he piloted his "Sno-Cat" through 80-mile winds, dug it out of drifts, and wrestled with heavy cases of food.

After the rescue was completed, Gold went back to his regular job as driver for the crews patrolling power lines. He shortly became ill at his station at Rainbow Tavern and died in a jeep taking him to Roseville for medical care.

•

BCE Plans 345-Kv Line, Largest on Continent

British Columbia Electric Co, Vancouver, B. C., plans to construct a 345-kv transmission line from Vancouver to its new Wahleach hydroelectric plant in the Fraser Valley. The proposed line would have the highest voltage of any on the American continent.

The 70-mile link from Vancouver to Wahleach Plant would be the first section of the line, which will be extended as required. Right of way acquisition and construction are proceeding on this first section. Provision is being made at the terminal site for three incoming 345-kv lines.

•

USBR Offices Merged

Consolidation of Bureau of Reclamation planning offices in Walla Walla, Washington, and Kalispell, Mont., into a single office at Spokane has been announced. The bureau estimates the consolidation will mean annual savings of $30,000.

Truman Renews Seaway Plea

The President bids Congress act promptly on plan for joint construction of St. Lawrence waterway and power project

If Congress intends to approve the controversial St. Lawrence seaway project this season, there was little sign of it last week.

With more than half the life of the 82nd Congress already passed, all bills providing for U. S. participation in constructing the project were bottled up in committees.

In spite of this, proponents continued to hold out hope that Congress would move to stop an all-Canada seaway.

Foremost of these proponents was President Truman who sent a special message to Congress last week urging prompt action on joint construction of the waterway and power development.

In public interest . . . "It seems inconceivable to me," the President wrote, "that the Congress should allow any local or special interest to divest our country of its rightful place in the joint development of the St. Lawrence River in the interest of all the people in the United States."

No sooner had the message been read to the Senate than Chairman Tom Connally of the Foreign Relations Committee stepped up to renew his opposition:

"The committee on Foreign Relations has been considering the subject for a long period. It will consider it again, of course, from time to time. However, I very much hope that the committee will adhere to its proposition of not reporting the bill favorably at this time or at any other time."

Could Bottle Up Bill . . . These were strong words from the chairman of the committee which handles the legislation in the Senate. Since committee chairmen, by tradition, have the prerogative of calling up bills for committee consideration, it was clear that Connally could keep the bill on ice for months if he chose.

But there was another side. In the House Public Works Committee, which had fiddled with St. Lawrence legislation much of last year, there seemed a chance of affirmative action. With a vacancy on this committee there was the chance that a St. Lawrence bill could be squeezed through by a one or two vote margin.

Once it clears the Public Works Committee, it would go to the House Rules Committee where more delay is almost certain.

There is no doubt that Canada is ready and willing to go it alone. But in an election year, Congress is in no great rush to decide an issue that it has been booting around for the past 21 years.

FPC Denies Rehearing of Its Cowlitz Decision

Federal Power Commission has reaffirmed its action in issuing a license to the City of Tacoma to build a 460,000 kw capacity project on the Cowlitz River in Washington.

It did this by denying an application for rehearing on the opinion and order issued last Nov. 28 granting the license. Washington State fishing interests, who fought the license at that time, had requested a rehearing after filing exceptions to the findings and conclusions of the FPC order.

Exceptions to the findings and conclusions, the FPC said, "are found to be without merit when considered together with evidence of record."

Con Ed Gets a Dust Collector

A new type dust collector has been delivered to Consolidated Edison Co of New York for installation in April at its Hell Gate generating station, Bronx, N. Y., to cut down smoke emission.

The new apparatus, known as the "Aerodyne" dust collector, was invented in Sweden and will be the first such installation in the New York area. It consists of 64 hollow steel cones, each more than 10 ft high. The device will be installed in the flue gas passages between one of the station's largest boilers and the present smoke control mechanism, an electrostatic precipitator. Gases coming from the boiler will enter the large end of the cone and emerge through some 2,000 slotted perforations in the sides. The gas stream must change direction sharply to pass through the slots. Most dust and ash particles are too heavy to make the sharp turn with the gas and will continue through to the narrow end of the cone. Here they are separated from the gas and removed by the station vacuum ash collection system. Particles fine enough to escape through the slots still will have to pass through the electrostatic precipitator before reaching the stack.

TRANSFORMER OPERATORS QUIZ:

"What outstanding bushing improvement by Kuhlman reduced line connection time 50%?"

Time was when linemen connecting transformer primaries found the job taking twice as long as it does today. That was before Kuhlman stepped into the picture with a revolutionary bushing clamp which made other types obsolete almost overnight!

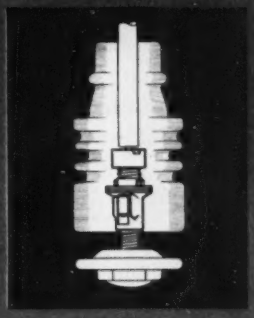
And just as Kuhlman blazed a trail on this important feature, so did it also point the way on many other outstanding transformer developments, including wound round cores, oil impregnation of transformer coils, street lighting transformers and silicone insulation. The adaptation in some form of all of these Kuhlman improvements by most other manufacturers has made the Kuhlman transformer one of the most copied transformers in the electrical industry.

This is a most important consideration for you the next time you buy transformers. And, if you haven't solved the question above as yet, look below.

Another Kuhlman first, the quick grip bushing

This is the old, time-consuming way to make a primary connection. Terminals had to be laboriously tightened onto line lead with wrench. Disconnecting took just as long.

Kuhlman "Quick-Grip" bushing clamp eliminates use of tools—cuts line connection time in half! A few simple twists of the knob shown on end of bushing clamps terminal firmly over lead.



This cross-section view illustrates "Quick-Grip's" simple operation. Line lead is inserted in bushing lead opening, then knob is turned to quickly and easily secure connection.

Here's the "Quick-Grip" in actual operation. Note how it not only speeds line connecting and disconnecting but also promotes safety since insulating knob eliminates possible contact by lineman with live parts.

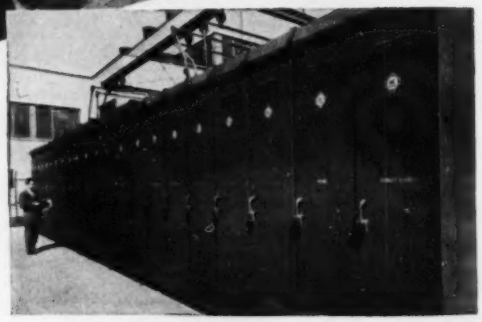
Kuhlman ELECTRIC COMPANY, BAY CITY, MICHIGAN

A great name in transformers. Write for descriptive bulletins on Kuhlman power, distribution, dry type, Sol-T-Kool and speedstor units.

EXPORT REPRESENTATIVES: Amhercutt Sweetser Electric Corporation, 67 Broad Street, New York 4, N. Y. Cable Address, Mincorpus, N. Y.

ALLIS-CHALMERS Switchgear Protects

IT TAKES electric power not only to operate finished telephones, but also to build them — for factory lighting, ventilation, cooling, and a multitude of processes and machines.



OUTDOOR SWITCHGEAR, adjacent to boilerhouse, feeds indoor substations and large high-voltage motors. Includes seventeen 1200-amp DZ-100B feeder oil circuit breakers and three 2000-amp DZ-100B main and bus-tie oil circuit breakers.

How Power is Distributed at Western Electric Plant

FLEXIBLE PRIMARY DISTRIBUTION

Electric power for the plant is obtained from a loop circuit supplying this industrial region, and feeds are taken from two power company substations to assure uninterrupted service. This precautionary duplication is continued in the primary distribution.

The 4160-volt outdoor switchgear itself consists of two main divisions. Each division is supplied by one feeder, and either can deliver power to any of the distribution lines. The two divisions are inter-connected by a bus-tie breaker.

ON-THE-SPOT SECONDARY DISTRIBUTION

The secondary distribution is accomplished with nine 500-kva lighting substations, eight 1000-kva power substations, and a 2000-kva boilerhouse substation. Six each of the power and lighting substations are paired together in six of the penthouses on the roof of the manufacturing building. These supply the main floor without utilizing valuable manufacturing floor space. Two more units are located on the lower floor of the building to supply that level with low voltage requirements. The remaining lighting substation is in the basement of the office building.

ALLIS-

FIRST IN THE U. S.

the Power Behind the Phone

AT Western Electric INDIANAPOLIS PLANT

SHUT-DOWN of the world's largest telephone-set manufacturing plant could cause a great loss in vitally needed production. To avoid such losses, Western Electric required a flexible but reliable power distribution and protection system for their giant new Shadeland Avenue plant at Indianapolis, Indiana.

To fill this requirement, Allis-Chalmers supplied a high-voltage primary-selective and low-voltage secondary-selective distribution system that is practically fool-proof. It would take the almost impossible simultaneous occurrence of four faults to throw this system out of order and cause a shut-down.

This Western Electric plant uses almost as much electric power as a community of 35,000 persons. The way this power is distributed is described on the facing page.

Adaptable to Your Needs

When you need power distribution equipment, it will pay you to follow Western Electric's example. Allis-Chalmers switchgear is standardized in basic design features for low initial and installation costs. But it is highly flexible in construction details and can therefore be built to suit every installation requirement.

Allis-Chalmers switchgear combines all elements for reliable circuit interruption with full safety to operating personnel. Safety features begin with a rugged, lap-welded, rigid steel enclosure with protective compartments. Interlocks and shutters provide positive safety to operators.

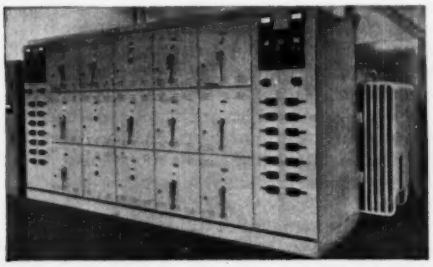
These same features plus many other details mean long, trouble-free operation. Attention to details is also characteristic of the circuit breakers themselves.

The G-50 low-voltage air circuit breakers used in the substations at the Western Electric Indianapolis plant have silver main contact tips and silver-tungsten arcing contact tips for good conductivity and low maintenance. Type DZ high-voltage oil circuit breakers are designed for low total arc energy to minimize oil and contact deterioration.

Information Available

Whether you need a complete new distribution system or a single breaker for increased capacity, your Allis-Chalmers representative can help you obtain maximum protection and reliability at minimum cost. Ask for general bulletin 18B6185A. It will provide you with a quick summary of the range and features available in Allis-Chalmers switchgear. Allis-Chalmers, Milwaukee 1, Wisconsin. A-3455

Chlorextol is an Allis-Chalmers trademark.

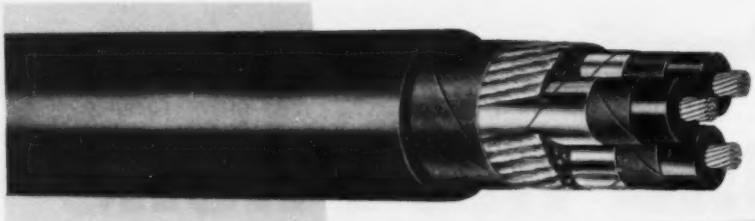


DOUBLE-ENDED 2000-kva LCS unit substation in boilerhouse has 1600-amp G-50 main, 1200-amp G-50 bus-tie, 600-amp G-50 feeder air breakers. Chlorextol liquid filled transformers are 4160-480Y/277 volts, 1000 kva self-cooled, 1250 kva forced-air-cooled.

PENTHOUSE installation of 500-kva (left) and 1000-kva (right) LCS unit substations. Lighting unit has 4160-208/120-volt transformer, 1600-amp main and tie breakers, 225-amp feeder breakers. Power unit has 4160-480Y/277-volt transformer, 2000-amp main breakers, 1600-amp tie breaker, 600-amp feeder breakers.

CHALMERS

WITH METAL-CLAD SWITCHGEAR



4 AWG stranded 3 conductor RoZone insulated, shielded, RoPrene sheathed power cable 15,000 volts, ungrounded neutral.

Rome RoZone®

Superior Ozone-Resistant Insulation Deserves Your CONFIDENCE

How Rome Cable Tests Ozone Cutting
Ozone resistance of insulating compounds is determined in an ozonizer. Specimens are subjected to ozone atmosphere of prescribed concentration. To see what happens note specimens below.

What Ozone Does to Cable Insulation

Unretouched photo of conventional rubber specimen after short-time ozone test.

Unretouched photo of RoZone specimen after long-time ozone test.

What Its High Ozone Resistance Means to You

Q: What is ozone?

A: Ozone is activated oxygen, a gas resulting from corona discharge, a phenomenon in the distribution and generation of high voltage electricity..

Q: How does it affect cable insulation?

A: Ozone, an enemy of conventional rubber compounds, causes accelerated cracking and embrittlement of cable insulation. The result . . . early cable failure.

Q: What does RoZone's high resistance to ozone mean to you?

A: First and most important, it protects you against cable failure due to ozone cutting . . . assures you of long-time dependability of service. With the power and control cables amounting to as little as 1 or 2 per cent of total generating station investment, you cannot afford to risk shut down of facilities by sacrificing insulation quality.

Further, RoZone is a type of insulation which has behind it better than 75 years of dependable performance. By independent laboratory tests, it exceeds all industry specification requirements.

While ozone cutting is a natural hazard of high voltages, low voltage failure is often traced to ozone cutting because of adjacency to rotating equipment or high voltage lines. RoZone, therefore, is your best protection *regardless of voltage classification.*

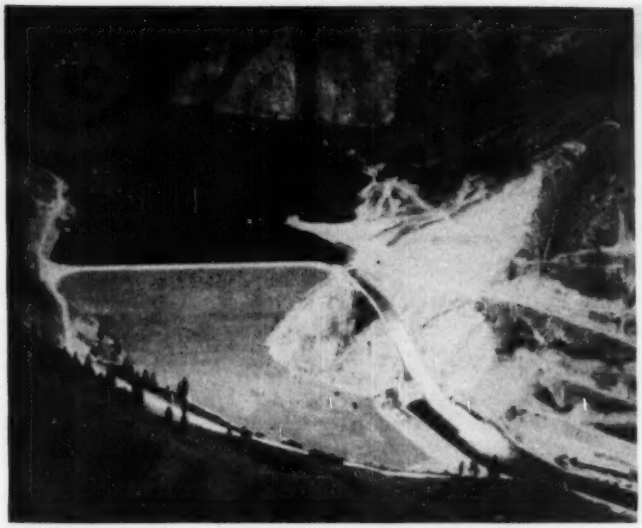
Approved by the country's leading consulting engineers for its well-balanced properties, RoZone merits your confidence for all high and low voltage work where dependable, long service life is paramount. We will be glad to send independent test data upon request.

It Costs Less to Buy the Best

RoZone is approved and accepted by leading utilities, industrials and consulting engineers.

ROME CABLE
Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

ROME CABLE ROME, N.Y.



ANDERSON RANCH DAM (13,500 kw) was among the smaller Reclamation projects that came on the line in 1951. Hydro plant is on the Boise River at South Fork, Idaho.

USBR Proud of Power Record

Starting its 50th year of operation, Reclamation has ten plants, 15 dams and 2,200 miles of lines under construction

As it began its golden anniversary year, the Bureau of Reclamation appeared as proud of its venture into the electric power field as its accomplishments in land irrigation.

The bureau with its predecessor Federal Reclamation Service was established in the Interior Department under the Federal Reclamation Act of June 17, 1902.

As the new year got underway, Reclamation had ten power plants and 2,200 miles of transmission lines under construction in addition to 13 storage dams, two diversion dams, six pumping plants, and 360 miles of main irrigation canals. It plans to ask Congress for money to begin new power plants and transmission lines.

21 Billion Kwhr Produced . . . Looking back on the year just ended, the bureau said its projects had produced more than 21 billion kwhr and provided irrigation water for upwards of six million acres of land. The bureau's 23 power plants had an installed nameplate capacity of 3,939,500 kw at the end of 1951—a gain of 771,100 kw over the previous year.

Accounting for most of this increased capacity was the 225,000-kw power plant at Davis Dam on the Colorado River in Arizona and the addition of four generating units of 108,000 kw each at Grand Coulee Dam in Washington. Other units put in service at bureau power plants in Idaho, Colorado, and Wyoming accounted for the rest.

From its record sales of 21 billion kwhr of energy, the agency figured it received about $35 million, which was returned to the Treasury. To send the power on the way to the eventual consumer, the bureau operated 6,260 miles of high voltage transmission lines.

Major Accomplishments . . . Among its major accomplishments of the year in the power field, Reclamation listed completion of Davis Dam on the Colorado and completion of Estes and Marys Lake power plants and Granby pumping plant on the Colorado-Big Thompson Project in Colorado.

For its irrigation and power projects during 1951, the Bureau of Reclamation awarded more than 850 construction, material, and supply contracts with a value of $107 million.

REA Co-ops Set Record for Energy Sales in '51

Rural electric cooperatives chalked up a new record for annual energy sales in 1951 with an approximate total of 9,717,000,000 kwhr—a gain of more than 25% over 1950's total sales.

Much more surprising, the average annual use per consumer along Rural Electrification Administration-financed lines jumped 14% over 1950 to 2,747 kwhr. A large part of the per-consumer increase can be traced to the use of more labor-saving devices on the farm.

REA loans to co-ops during 1951 totaled nearly $173 million, of which about $34.33 million went to finance construction of new generation and transmission facilities. During the year, REA borrowers added 88,000 miles of line bringing the grand total to 1,177,000 miles. New co-op customers in 1951 totaled nearly a quarter of a million bringing the overall total to about 3,656,000.

Since the REA was authorized in 1935, it has loaned more than $2 billion to 1,012 systems. Of this amount, the co-ops have paid back $205 million on the principal, and some $121.8 million in interest.

REA borrowers have made advance payments on principal totaling $41.5 million during existence of the loan agency.

•

Construction Is Started on 230-Kv Line in Illinois

Work is underway on the 145-mile, 230-kv electric power transmission line that will connect Union Electric Co's generating plant on the Mississippi River at Cahokia, Ill., with Electric Energy Inc's power plant on the Ohio River near Joppa, Ill. The line will cost about $10 million.

The power line will permit the flow of electric energy either way so that the Union Electric system will have available any surplus power that may be generated at Joppa. The Joppa Plant is being built primarily to provide energy for the Atomic Energy Commission's A-bomb plant at Paducah, Ky.

Giant 64-ft laminated wooden crossarms will be used on the 230-kv line for turns and terminals. Forty-six-ft cross-arms will be used on the running line.

FISH LADDERS such as this one at Washington end of Bonneville Dam on the Columbia River enable salmon to get over the dam in easy stages. The ladders at Bonneville are 40 ft wide and have a rise of 1 ft every 16 ft. They have been in operation at dam since '38

CURVED PORTION is shown in this picture of Bonneville fish ladder. Studies conducted by the U. S. Fish and Wildlife Service indicate Bonneville Dam has had no significant effect on salmon runs although there has been some loss of fingerlings in downstream migration

CHINOOK SALMON takes to the air in climbing fish ladder at Bonneville Dam on the way to spawning grounds upstream on the Columbia

BAKER RIVER fish are caught in a trap at the far end of powerhouse, carried in a tank car to holding pools, and then lifted over the dam

Taking Fish for a Ride up the River . . .

. . . is part of job of operating dams in the Northwest. Public, private power are developing protective devices

Ferrying fish over dams is a serious business in the Pacific Northwest. In an attempt to prove that fish and dams can live together, dam-builders—private and public—operate fish ladders, buckets, boats, and tank cars to help the fish on their upstream journey to spawning grounds.

This practical experience with fish protective measures and current research work should point the way to a solution of a problem which has plagued the Northwest for a number of years—preserving the lucrative fishing industry and at the same time developing the power potential of the Columbia River and other streams.

Ever since large dam building projects have been underway, the future of the salmon industry has troubled Northwest residents. Without protective devices, large numbers of fish were lost each year as they went upstream to spawn and many fingerlings failed to survive the return journey.

Finding Congress reluctant to make appropriations for dam projects that fishing interests claimed would doom the salmon industry, the Army Corps of Engineers and their allied power-dam expansion advocates last summer informed the U. S. Fish and Wildlife Service that they were prepared to follow any steps in the construction of power dams that would keep the salmon industry alive.

Fish and Wildlife did not have the answer on how to preserve the salmon short of halting dam construction, so it called on fisheries and game departments of the Northwest states, British Columbia, and international salmon agencies to cooperate in a research program. At least three years will be required before many of the answers can be found. In the meantime dam construction will proceed taking advantage of presently known fish conservation practices with the understanding that further measures will be added later.

Devices for getting the fish upstream have been fairly successful. Puget Sound Power & Light Co, Seattle, has fish protective facilities at each of its

CHECKER counts salmon as they swim across luminous counting board in Bonneville Dam fish ladder. Accurate counts are kept of the fish on the journey upstream over dam

three dams on the Baker, White, and Columbia Rivers. Rock Island Dam has three ladders, in the middle and at either end. Each ladder is a series of elevated pools over which a stream of water pours and by short jumps the fish go the height of the dam.

The Rock Island ladders were built in 1933 at a cost of $600,000 and have been operated since 1939 by the Fish and Wildlife Service. The count of salmon today is higher than in '33.

Caught in a Trap . . . Baker River salmon are caught in a fish trap that spans the river below the dam, and carried some 400 ft in a water-filled tank car on a narrow-gauge track to aerated holding pools. Here they are lowered into a water-filled bucket which is picked up by an aerial cable for a 900-ft ride over the dam at the end of the day. If the gates are open, the fish take another ride for a mile upstream in a boat, so they will not drift down and spill over the dam.

At Bonneville Dam on the Columbia River, gravity fish ladders have been in operation since 1938. Fish locks were installed but are used only for experimentation. McNary Dam, higher than Bonneville, eventually will have both fish ladders and locks, but the locks will be for emergency and experimental purposes.

The toughest problem in safeguarding fishing is getting the fingerlings downstream to salt water. Many of the baby fish are cut to ribbons in the power dam turbines, while others die from the decompression to which they are subjected as they come down over the spillways of the high dams.

Experiment Underway . . . Experiments to determine the mortality rate were begun last year at Puget Sound P&L's Baker River Dam near Concrete, Wash., and will continue next year. Although no official reports have been made, it is reported unofficially that the mortality rate so far has not been so high as feared, with at least a third of the fingerlings coming through unharmed.

Next spring, some 200,000 young salmon will be used as "guinea pigs" in this experiment. They will be marked by clipping fins and released above the 265-ft spillway or near the turbine intake. Nets below the dam will recover the fish that survive.

Tacoma City Light, which has been granted a license to build two dams on the Cowlitz River by the Federal Power Commission on condition that adequate fish protection measures be taken, has worked out a plan for getting the fingerlings downstream. It calls for collection of the fingerlings through orifices in the upstream face of the dam and piping them into a decompression chamber for release below the dam. Fisheries experts generally have little faith in this plan and Tacoma is seeking to improve it.

The flume to Puget Power's White River power plant is protected by eight power-driven rotating screens, 14 ft in diamater, that deflect the fish downstream.

Hatching more fish, rather than saving them, might be another solution to the problem. Experiments of this nature are being carried on in western Oregon where the Corps of Engineers is supervising construction of two dams on the Willamette River.

Political Element . . . There is a strong political element in the fish-dam controversy. The fisheries interests have been able to obtain substantial support from sports fishermen, who are very strong in Washington State.

One aspect hurting the dam builders is the distrust in which private power has been held in western Washington, a distrust that sometimes has been transferred to public agencies when they want to build a dam in a fish stream.

The dam builders have been winning more public support in recent years by pointing out that hydro power can provide more jobs than the fisheries industry, and by suggesting the decline of fish runs has been due more to the greed of commercial fishermen and stream pollution than to dam construction. Their first argument is hurt somewhat by the fact that substantial blocks of power generated by new dams have been earmarked for the aluminum industry which provides fewer job per kw than any other industry.

Sangamo J Meters

preferred by men who work with meters

Your meter superintendent and his men prefer meters that can be quickly and easily calibrated, saving costly man-hours for his company.

Men who work with meters *know*, that Sangamo J Meters, as received, seldom need any calibration to meet all generally accepted standards of accuracy.

Simple full-load and light-load adjustments—readily accessible from the front, exceptionally clear visibility, and easy removal of registers, are a few of the reasons why J Meters are favorites with meter testers everywhere! They're faster to test—easier to calibrate. An ordinary screwdriver is the only tool needed.

Economical replacement of parts is another of the reasons why the men who work with meters prefer J Meters. When advantageous, either the current or potential element may be replaced separately.

Only Measured Facts are Known Facts

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

Sangamo J Meters have proved their ability to meet today's requirements and tomorrow's anticipated loads with sustained accuracy, economy of maintenance and troublefree performance.

AN EXECUTIVE WITH A WELL KNOWN UTILITY ASKS—

"Just How Much Radio Interference Caused by Insulators does a PINCO 'NOCORONA' UNIT Eliminate?"

The best way to answer this question is to say that at radio frequencies, Pinco "Nocorona" Insulators are *silent*. In other words, radio interference is reduced to a minimum!

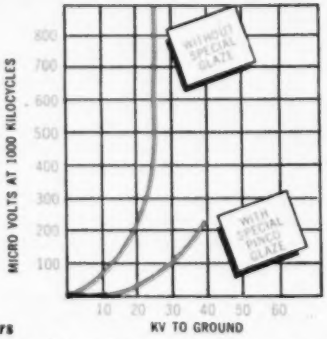
In the 1920's, as the popularity of radio increased, set owners demanded that something be done about power line "interference." In 1929, Pinco introduced its "Nocorona" units which proved to be an effective means of eliminating radio interference. Today, thousands of these Pinco "radio-proofed" insulators are in service on distribution and transmission lines from coast to coast. Television viewers too, are benefiting by the application of this Pinco principle in previously affected areas.

Here's the ANSWER . . .

Pinco "Nocorona" units combine all of the outstanding features of Pinco standard Insulators, *plus* the application of a special glaze at the critical points—the conductor groove, tie wire grooves and the pinhole. This glaze, being conducting, creates a bond between the conductor and the insulator, thus eliminating the possibility of brush discharge from the conductor to the insulator.

Here's the PROOF . . .

The accompanying chart shows the performance curves of the Pinco L-75 (plain) and the L-75R (Nocorona) 45 K.V., one-piece Insulators . . . positive proof that Pinco "Nocorona" Insulators definitely eliminate radio interference!



For Complete Information regarding Pinco Pin-Type Insulators refer to page 28 of Pinco Catalog No. 49 or contact the Joslyn office in your locality.

PINCO INSULATORS

The Porcelain Insulator Corporation
766 Main St., Lima, N. Y.

Sales Agents: JOSLYN MFG. & SUPPLY CO. *Offices in Principal Cities*

MEETINGS

PEA Plans February Meetings

Association's Hydraulic Power, Systems Operation, and Relay Committees will hold discussion sessions

Pennsylvania Electric Association will hold several committee meetings this month.

Among those to be held will be the Hydraulic Power Committee meeting, which is slated for Feb. 7-8 at the William Penn Hotel, Pittsburgh, Pa. The meeting, under the chairmanship of E. T. Schuleen, Safe Harbor Water Power Corp, will be devoted principally to reports on operating and maintenance problems. It will be highlighted by a talk on pumped storage for hydroelectric power to be given by Frank E. Jaski, assistant chief engineer of Allis-Chalmers Manufacturing Co.

The Winter Meeting of the Systems Operation Committee is scheduled to be held Feb. 14-15 at the Benjamin Franklin Hotel, Philadelphia. A. C. Hartranft, chief load dispatcher of the Philadelphia Electric Co, is chairman. Topics for discussion will include the following:

1. Standardization of System Operating Diagrams.

2. Insuring Reliability of Leased Circuits.

3. Survey of Methods Used in Preparing Estimates of Annual Peak Loads.

An inspection trip to the Westinghouse Electric Corp turbine plant at Lester, Pa., has been arranged.

The Relay Committee Meeting will be held at the Fort Stanwix Hotel in Johnstown Feb. 20-21. The meeting chairman is F. S. Fehr, Metropolitan Edison Co. A symposium on breaker back-up protection will be included on the agenda. Arrangements have been made for an inspection trip of the Pennsylvania Electric Co microwave relaying and dispatchers facilities.

Missouri Valley Group to Hold Parley Feb. 7-8

The Industrial and Commercial Sales Conference of the Missouri Valley Electric Association will be held Feb. 7-8 at the Hotel President, Kansas City, Mo. Earle W. Gray, Oklahoma Gas & Electric Co, is committee chairman.

The two-day program will include discussions on the following:

1. Service Continuity from Both the Customers and Power Companies Standpoint.

2. Public Relations through Salesmanship.

3. Current Economic Factors of Competitive Power Problems.

A slide film, entitled "Invisible Battalions," will be presented. It will be introduced by Clifton A. Walter, editor of "Load Magazine," a General Electric Co publication.

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EEI Meeting Scheduled

The Electrical Equipment Committee of Edison Electric Institute will hold a meeting at the Netherland Plaza Hotel, Cincinnati, Ohio, Feb. 11-12. J. H. Foote is chairman. Sessions will be conducted by these divisions: Apparatus and design, utilization, foreign practice, operating and maintenance, and system engineering.

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PUAA Region 1 to Meet

Public Utilities Advertising Association has scheduled its Region 1 meeting for Feb. 13-14 at the Parker House, Boston, Mass. John J. Barry, assistant manager of the advertising and promotion department of Boston Edison Co, is chairman of the region. Program for the two-day meeting will feature discussions of public relations, advertising, and publicity problems in the utility field.

CALENDAR

National Association of Purchasing Agents
Public Utility Buyers' Conference, Cleveland Hotel, Cleveland, Ohio, February 4-5.

Instrument Society of America
1952 Regional Power Plant Instrumentation Conference, New York Section, Hotel Statler, New York, February 7-8.

Missouri Valley Electric Association
Industrial-Commercial Sales Conference, Hotel President, Kansas City, Mo., February 7-8; Engineering Conference, Hotel President, Kansas City, Mo., April 2-4.

Pennsylvania Electric Association
Winter Meeting, Transmission-Distribution Committee, Penn Harris Hotel, Harrisburg, Pa., February 7-8; Hydraulic Power Committee, William Penn Hotel, Pittsburgh, Pa., February 7-8; Systems Operation Committee, Benjamin Franklin Hotel, Philadelphia, February 14-15; Winter Meeting, Relay Committee, Fort Stanwix Hotel, Johnstown, Pa., February 20-21; Prime Movers-Electrical Equipment Committee, Benjamin Franklin Hotel, Philadelphia, February 28-29.

Powers-Communication Contractors Association
Annual Convention, Roosevelt Hotel, New Orleans, La., February 10-12.

Edison Electric Institute
Electrical Equipment Committee, Netherland Plaza Hotel, Cincinnati, Ohio, February 11-12; Transmission-Distribution Committee, New Hotel Jefferson, St. Louis, February 14-15; 18th Annual Sales Conference, Edgewater Beach Hotel, Chicago, March 31-April 3; Purchasing Stores Committee, Roosevelt Hotel, New Orleans, La., May 11-14.

★**Public Utilities Advertising Association**
Region 1 Meeting, Parker House, Boston, Mass., February 13-14; Annual Convention, Hotel Radisson, Minneapolis, Minn., May 8-9.

Public Information Program
East North Central Region Meeting, Fort Wayne Hotel, Columbus, Ohio, February 21.

★**North Central Electric Industries**
Annual Convention-Trade Show, Hotel St. Paul, St. Paul, Minn., February 24-28.

American Society for Testing Materials
Spring Meeting-Committee Week, Hotel Statler, Cleveland, Ohio, March 3-7; Annual Meeting, Hotels Statler-New Yorker, New York, June 23-27.

National Electrical Manufacturers Association
Section Meeting, Edgewater Beach Hotel, Chicago, March 10-13; 4th International Lighting Exposition - Conference, Industrial - Commercial Lighting Equipment Section, Cleveland Auditorium, Cleveland, May 6-9.

Illuminating Engineering Society
South Pacific Coast Regional Conference, Hotel Sir Francis Drake, San Francisco, March 13-14; Southwestern Regional Conference, Hotel Tulsa, Tulsa, Okla., April 6-8; Southern Regional Conference, Hermitage Hotel, Nashville, Tenn., April 20-22; Canadian National Conference, Hotel General Brock, Niagara Falls, Ontario, Can., April 30-May 2; Great Lakes Regional Conference, Hotel Statler, Cleveland, Ohio, May 5-6; East Central Regional Conference, Webster Hall Hotel, Pittsburgh, Pa., May 22-23; Northeastern Regional Conference, Hotel Preston, Swampscott, Mass., June 19-20.

Pacific Coast Electrical Association
Operating Economics Section Conference, Hotel California, Fresno, Calif., March 20-21; Administrative Services Section Conference, Los Angeles, April 17-18; Business Development Section Conference, Hotel Huntington, Pasadena, Calif., April 24-25.

A & M College of Texas
Annual Conference for Protective Relay Engineers, Department of Electrical Engineering, College Station, Tex., March 24-26.

American Society of Mechanical Engineers
Spring Meeting, University of Washington, Seattle, March 24-26; Semi-annual Meeting, Sheraton-Gibson Hotel, Cincinnati, Ohio, June 15-19.

American Power Conference
(Formerly Midwest Power Conference)
Sherman Hotel, Chicago, March 26-28.

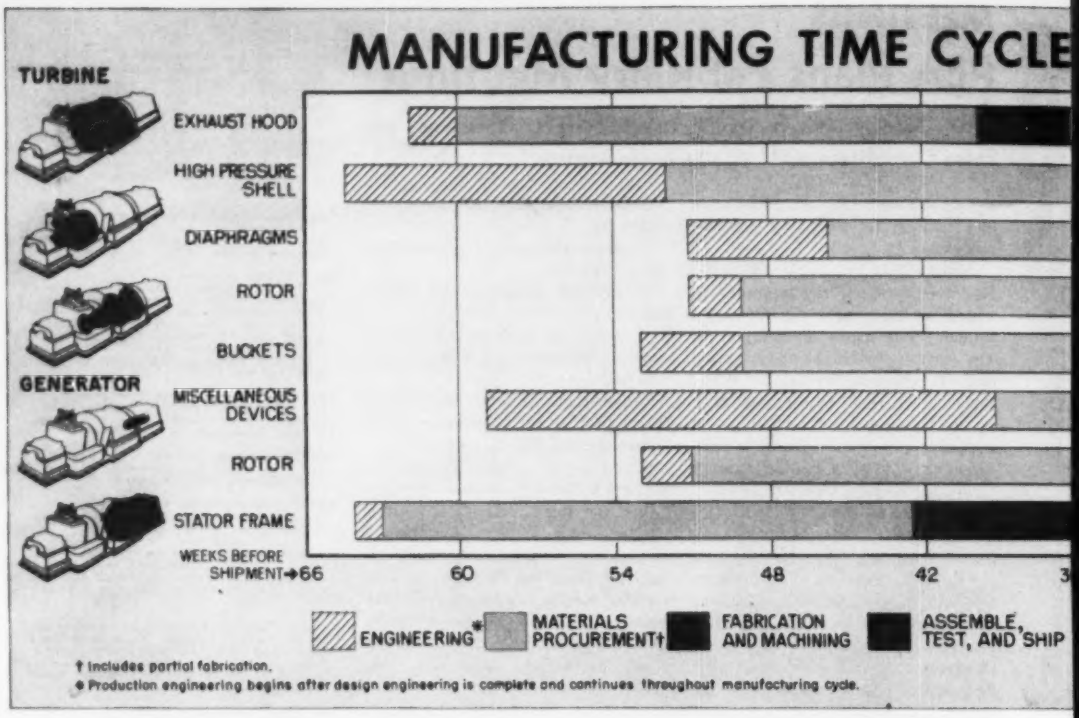
Maryland Utilities Association
Lord Baltimore Hotel, Baltimore, April 4.

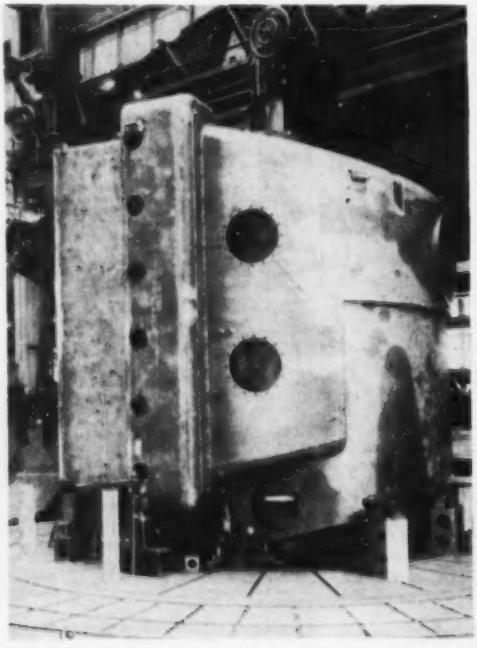
American Institute of Electrical Engineers
Welding Conference, Rackham Memorial Bldg., Detroit, Mich., April 16-18; arranged jointly by American Welding Society, Detroit Section, and Industrial Electrical Engineers Society, Detroit; Summer General Meeting, Hotel Nicollet, Minneapolis, Minn., June 23-27.

American Public Power Association
Spring Convention, Hotel Olympic, Seattle, April 29-May 1. Joint Meeting with Northwestern Public Power Association, April 28.

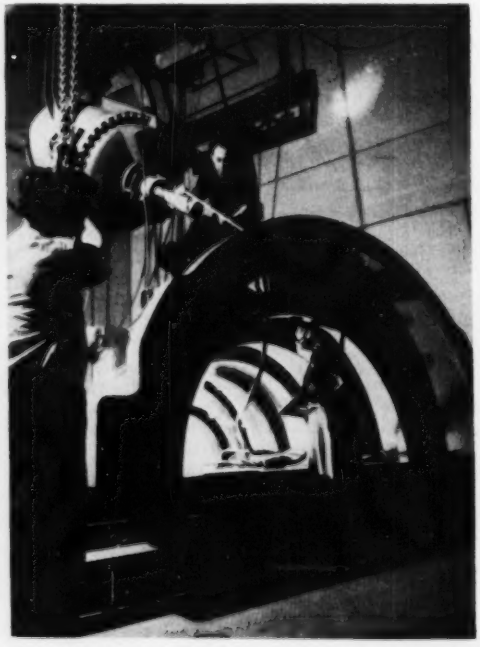
International Organization of Standardization
Triennial Meeting, Columbia University, New York, June 9-21.

★ Addition this week.

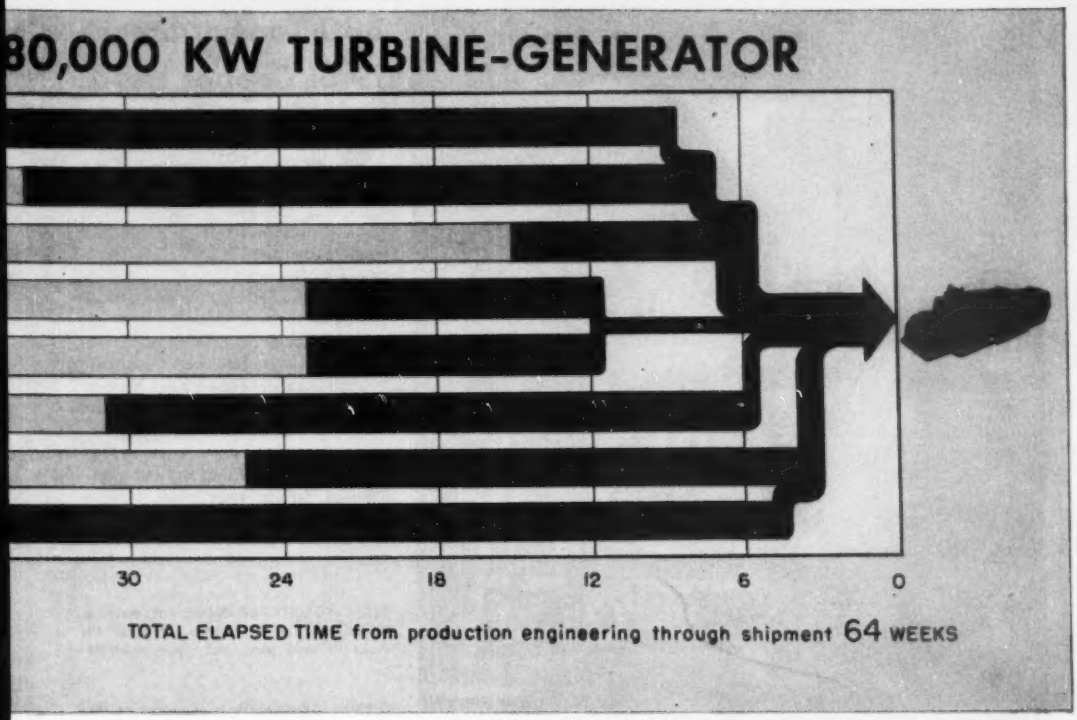




TURBINE EXHAUST HOOD being final machined, an operation that requires 11 weeks. The finished hood is a massive job of 66 tons



TURBINE SHELL gets an X-ray. Magnetic and X-ray testing, chipping and welding of defects, and heat treatment requires 13 weeks

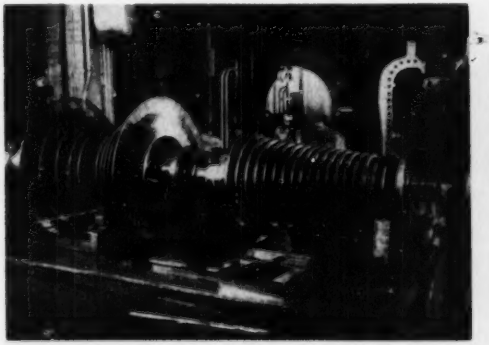


It Takes Time to Make Them

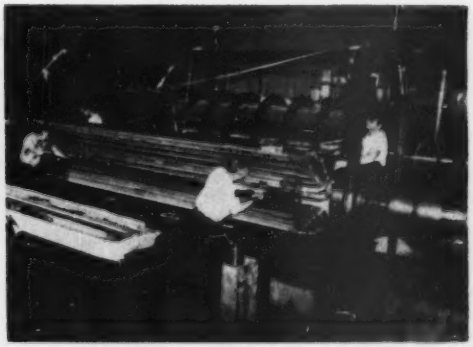
. . . General Electric Co shows that building an 80,000-kw turbine-generator is a long job

Time is as important as materials in making a turbine-generator. It takes a lot of both. That is why the industry won't put 11 million kw on the line in 1952 as many of its leaders would like to do. General Electric Co, the nation's largest manufacturer of the machines, has released in detail its production schedule for this equipment.

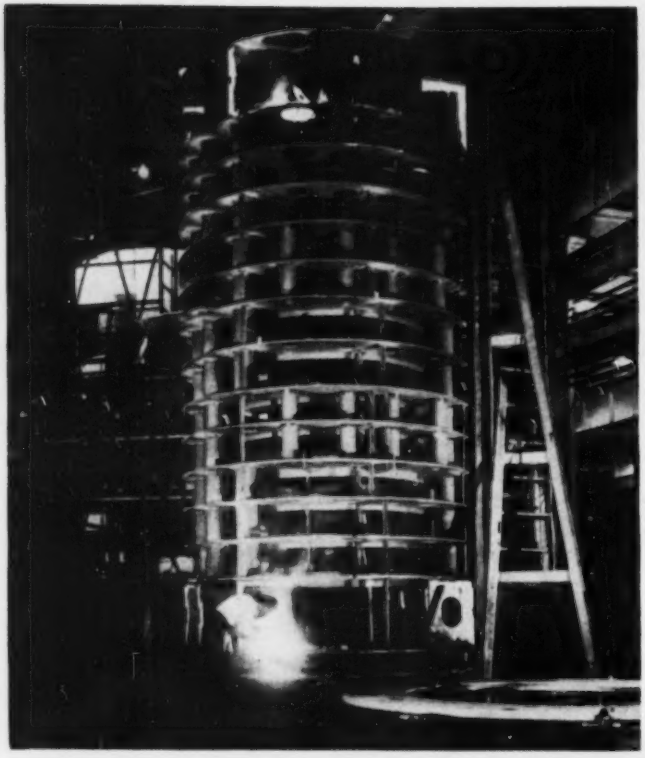
GE says it takes 64 weeks after design engineering has been completed to make an 80,000-kw unit. The catch is that this 64-week period can't begin until the unit finds its place on the shop production schedule. Previously ordered units under NPA authorized scheduling take precedence. So an order placed today may not be started



TURBINE ROTOR has 4,500 buckets. Fitting them, applying cover bands, and final machining and balancing of rotor require 6 weeks



GENERATOR ROTOR needs copper field windings. Inserting and insulating the pre-shaped windings in the rotor slots requires 6 weeks



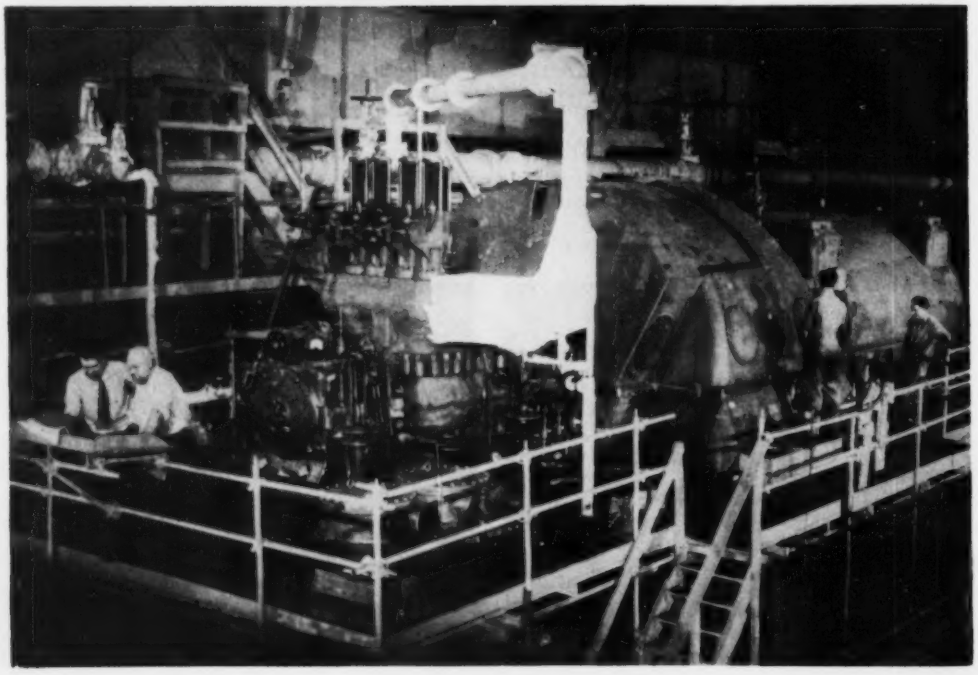
880 Tons of Steel, 19 of Copper Used

for a year and completed for two to three years.

The immense size of many of the components and the exactitude of the machining required contribute to the lengthy manufacturing period. And most of the materials used are hard-to-get CMP metals. An 80,000-kw unit requires 880 tons of steel, 19 of copper, and 2 of aluminum. Much of the tonnage of these metals is returned as scrap to producers for remelt. A turbine exhaust hood takes 94 tons of steel but loses 28 for a finished weight of 66. A generator rotor begins with a 94-ton ingot, loses 67 tons of scrap, weighs 27 tons without windings. A turbine rotor made from a 77-ton ingot weighs only 22 tons without buckets, a loss of 55 tons.

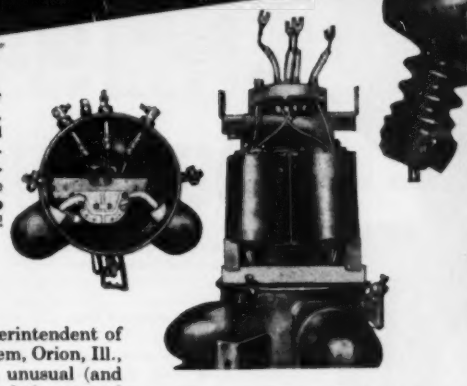
GENERATOR STATOR FRAME, left, makes a lot of work for the welders. It takes 16 weeks to weld parts into single assembly

TURBINE GENERATOR is assembled at the factory and driven by steam for operational testing before it can be shipped



FLOOD BATTERED...

...THEN BURIED IN MUD, THIS L-M ROUND-WOUND® TRANSFORMER IS READY TO GO RIGHT BACK TO WORK!



Battered by flood water that shattered the pole, and buried under mud and rocks, this L-M Round-Wound transformer suffered only minor damage —and there wasn't a drop of water or mud inside!

PHOTOS BY K. M. NORCROSS

K. M. Norcross, superintendent of Sherrard Power System, Orion, Ill., recently reported an unusual (and unintentional) test of the rugged construction of L-M Round-Wound transformers. Here is what he says about it:

"Last spring the Mississippi River reached its highest flood level in 20 years. Before dawn one morning the river went through a dike, taking with it one of our poles on which was mounted one of your 5 kva Round-Wound transformers.

"We never saw that pole again—until a month ago. A dragline cleaning out a drainage ditch 1500 feet away dug the transformer out from under 5 to 10 feet of mud and rocks. Two feet of the pole was still attached but was badly shattered, and the tank was badly scraped and battered—evidence of the terrific battle the transformer and pole had with the river.

"The internal condition was excellent—almost as though it had just come off the assembly line. The oil was gone and one bushing was chipped and loose—but there wasn't a drop of mud or water inside and it was obvious that the damage occurred when the transformer was dug out.

"Note, in the enclosed pictures, how clean are the coils, the core, and the inside of the tank. We are letting the core and coil out in the air for a time, just in case there is any water inside —and then we'll put it back on the line. I just thought you'd like to know how much abuse a Line Material transformer can take!"

(Signed) K. M. NORCROSS,
Superintendent

At L-M's request, the transformer was shipped to the Zanesville plant, where it was tested and found to be in perfect operating condition. The only work required was replacement of bushings, repainting the tank, and refilling with oil.

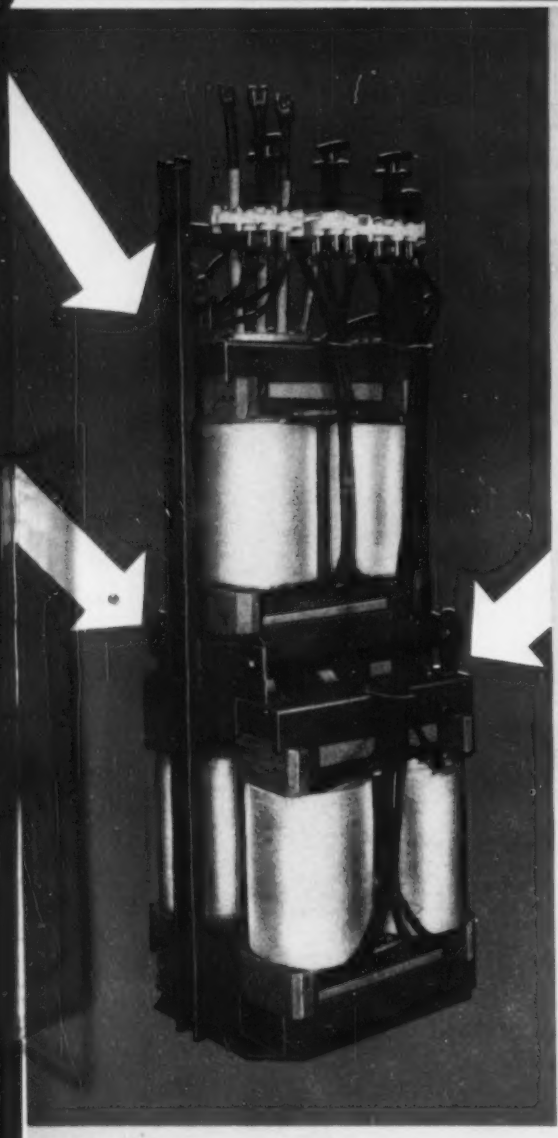
There's much more to L-M Round-Wound transformers than just rugged construction and flood-proof tank sealing. Ask the L-M Field Engineer to tell you about their superior performance characteristics and long life. Or write for bulletins. Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

75

LINE MATERIAL

Transformers

RELY ON "ROUND-WOUNDS" ... BETTER ALL AROUND!



Three single-phase core-coil assemblies, one above and two below, for simplified mounting and best cooling. Rigidly held in strong channel-steel frame which fits into steel channels welded inside tank wall.

It's easy to replace any one unit in L-M 3-PHASE ROUND WOUNDS®

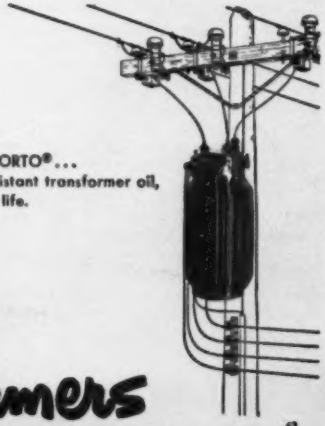
L-M Round-Wound transformers have exceedingly high impulse strength and overload capacity so that burnouts are extremely rare. But if a coil *should* burn out, you don't have to replace the whole transformer. The core-coil assembly from any one phase is simply removed from the rack and a replacement unit quickly installed.

It's as simple as that, and almost as quick . . . whether it's done in your own shops or in one of the authorized L-M Transformer Service Shops near you.

Under emergency conditions you can restore service in a hurry because with L-M construction you can connect two units in open wye or delta.

Besides the advantages of rapid core-coil replacement and fast service restoration, L-M 3-phase transformers give you all the desirable Round-Wound performance features . . . with the wound core that isn't cut or disturbed in any way after annealing . . . with the round coils wound right onto the core. An L-M "exclusive!"

Get the whole story. Ask the L-M Field Engineer or write Line Material Company, Transformer Division, Zanesville, Ohio (a McGraw Electric Company Division).



Now furnished with ORTO®... L-M's oxidation-resistant transformer oil, inhibited for longer life.

LM®

LINE MATERIAL Transformers

Complete Coordinated Equipment for Distribution Today

43

Another Example of L-M Leadership

L-M's ORTO

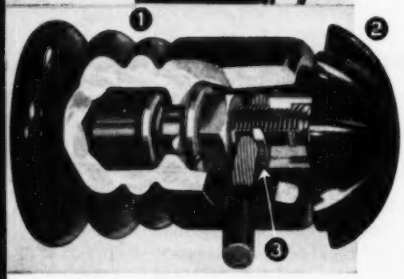
(Oxidation-resistant transformer oil)

gives you all these advantages:

- longer life for the transformer, with the same overload capacity, or . . .
- higher overload capacity with the same transformer life
- reduced oil acidity and sludging
- maintained high impulse strength

and

- ORTO mixes with any other oil, conventional or inhibited
- ORTO will not react with other inhibitors
- ORTO is available as a *concentrate* for adding to your present oil stocks, for adding to power transformer oils, and for prolonging the life of reclaimed oil



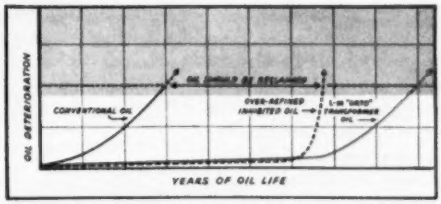
L-M'S NEW SIDEWALL BUSHING

For fast, permanent transformer connections. Heavy machined wet-process porcelain (1) with ample leakage distance. Extra strong finger-grip handle (2). Lineman inserts bared end of conductor into the connector (3), spins the knob tight. Hole only on one side of bushing; wire can't go through to snag clothes or cause accidental contact. Leak-proof, inherently siphon-proof; takes up to two full-size conductors.

L-M DISTRIBUTION TRANSFORMERS

Available in sizes up to 500 kva, voltages from 480 to 14,400, all ORTO-filled. Dry types 1½ to 50 kva, 600/120-240 volts.

Since its announcement, which led the industry, ORTO® has been a phenomenal success. Naturally L-M and L-M research engineers are gratified by ORTO's acceptance and this acceptance was deserved, by the long, rigorous careful checking into oils and inhibitors. New accelerated test methods were developed, to make sure that ORTO was as good as expected. ORTO was thoroughly tested and proved by extensive investigation and accelerated life tests representing many years of service.



Comparative curves show the deterioration of transformer oil in service. A high-grade conventional oil deteriorates at a gradually accelerating rate. Over-refined oils may have a better response to the inhibitor; but once the inhibitor has been used up, the oil has little resistance to oxidation, and deteriorates rapidly. ORTO brand oil is a high-grade conventional oil with an inhibitor which greatly extends the beginning of the deterioration, which, when it finally starts, assumes the same gradual curve as with any high-grade conventional oil.

Ask the L-M Field Engineer for information on ORTO; or write Line Material Company, Transformer Division, Zanesville, Ohio (a McGraw Electric Company Division).

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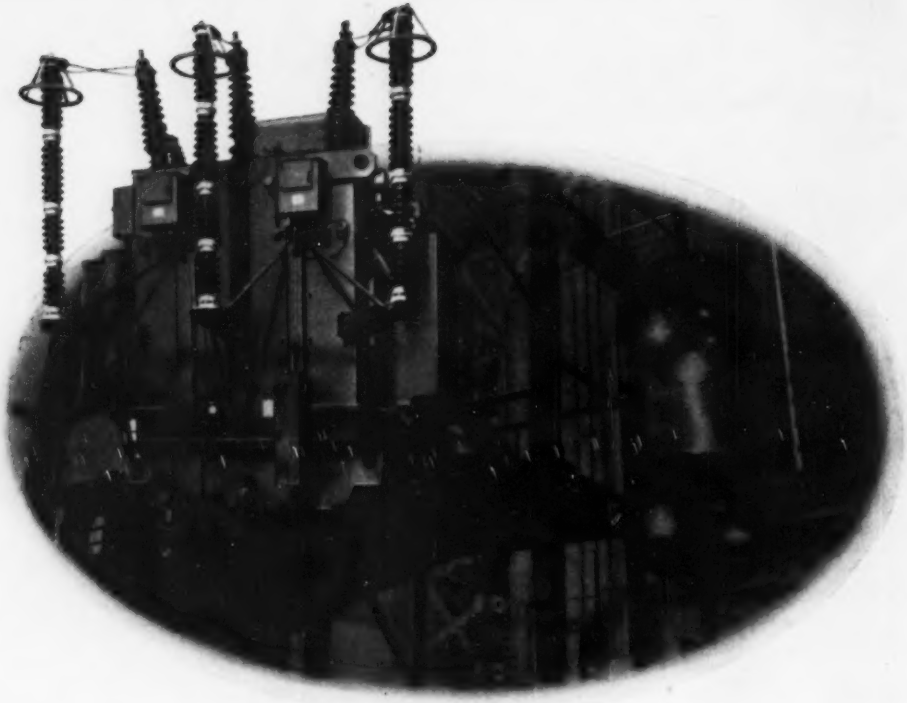
LINE MATERIAL . . . Transformers

Complete Coordinated Equipment for Distribution Today



ADDED PROOF of power transformer quality

SELECTIVE SURGE TESTING ON THE PRODUCTION LINE!

Your greatest assurance of reliability is *proof by actual test.* That's why many users specify ASA and NEMA surge tests.

That's why Westinghouse engineers, too, surge test certain power transformers on the production line. In fact, it has been a production line procedure at Westinghouse for many years. Routine daily tests prove quality of design, workmanship and materials. An ever-increasing number of transformers are being quality control tested. Such tests are particularly important on transformers rated above 69 kv.

Surge testing on the line is *that extra step* that assures Westinghouse quality . . . quality that means extra dependability for you.

Your Westinghouse representative will be glad to discuss all the advantages that Westinghouse power transformers offer you. For details on production line surge testing, ask him for a copy of booklet B-5471, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-70621

YOU CAN BE SURE...IF IT'S

Westinghouse

POWER TRANSFORMERS

W. E. OLSON E. K. THORGAARD J. F. OWENS

Olson, 2 Managers Made VPs

Northern States Power appoints the executive assistant, Thorgaard and Owens as vice presidents

Northern States Power Co has elected three vice presidents. They are Walter E. Olson, E. K. Thorgaard, and J. F. Owens.

Olson has served as an executive assistant to the utility's president since 1941, when he joined Northern States. Prior to joining the company, he was for six years secretary-manager of the North Central Electric Association.

Thorgaard has been Minneapolis division manager since July, 1951, and will continue in this post besides serving as vice president. He started with the utility in 1923 as an electrician's helper in the special construction department at Minneapolis.

Was Sales Engineer . . . After working in several Wisconsin and Minnesota divisions, he was made traveling lighting sales engineer for the Southwestern and St. Cloud divisions in 1934. Two years later he went to the St. Cloud division as lighting sales engineer. In 1942 he was transferred to the Glenwood district as management representative for the western half of the St. Cloud division and was made manager of that division in 1945.

In addition to serving as a vice president, Owens will remain as manager of the St. Paul division, a position he has held since September, 1951. He began with the company in 1933 as a clerk in the accounts receivable and credit departments at Minneapolis. In 1936 he was transferred to the general office accounting staff and four years later was made assistant manager of the Fargo division. He returned to Northern States Power after serving four years with the Army during World War II and was made assistant to the manager of the St. Paul division.

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New Officers Elected

J. B. Harris, Jr, president of the Rumsey Electric Co, has been elected vice president of the Electrical Association of Philadelphia. Other officers elected were Philip H. Ward, Jr, president of Ward Electric Co, treasurer; and Robert J. Moran, chief inspector of the Middle Department Association, Fire Underwriters, secretary. Emery W. Loomis, vice president of Westinghouse Electric Corp, was re-elected president of the organization.

•

Elmer B. Hurst, manager for Virginia Electric & Power Co at Woodstock, has been appointed manager for Vepco at Altavista. He succeeds **Roy R. Price,** who was recently made manager for the company at Virginia Beach. **Stuart C. Will,** Vepco's distribution engineer at Suffolk, succeeds Hurst at Woodstock. Hurst began with Vepco in 1928 as a storekeeper in Norfolk. Will came to Vepco in 1933 as a student engineer.

Joseph O. Lucy, office assistant with Arkansas Power & Light Co at Magnolia, has been promoted to office manager of the western division at Hot Springs. Lucy succeeds J. Watt Smith, who recently was promoted to local manager of the Hot Springs office.

San Diego G&E Elevates de Jonge to New Post

San Diego Gas & Electric Co has announced the appointment of C. P. de Jonge as general superintendent of the company. He succeeds H. A. Noble who recently was elevated to the position of vice president in charge of operations (EW Nov 12, 1951, p 22).

In his new post, de Jonge will have charge of electric production, transmission, and distribution, as well as gas transportation and shops, buildings, and grounds.

In 1930 de Jonge joined San Diego G&E as an inspector in the gas department. He became a supervisor in 1937, distribution engineer in 1941, and superintendent of the gas department in 1944, the position he has held until now.

C. P. de JONGE

Among the other appointments made by the utility were J. F. Sinnott as system planning engineer; Frank R. Bater, superintendent of the gas department; Walter A. Zitlau, assistant superintendent of electric production; and E. R. Prout, chief of the Silver Gate Station. Zitlau has been chief of the Silver Gate Station since September 1945.

San Diego G&E also named William D. Chambers as auditor of plant construction and Jack A. Graham internal auditor.

•

Henry W. Mertens, who has served as assistant division manager of the western division at Lewiston for Central Maine Power Co since 1942, has been appointed manager. In another appointment, **Roland S. Rand** was made manager of the company's newly

formed Lewiston district. Mertens succeeds **Orlo D. Mudgett,** who has retired after 43 years' service in the utility industry in Maine, 23 of which were spent as manager of the western division. Mertens joined the company in 1934. In 1940 Rand was appointed district superintendent at Bridgton for Central Maine.

W. D. Dent, manager and assistant treasurer of Lockhart (S. C.) Power Co, has been elected president of the utility. **W. F. Tribble** has been named to succeed Dent. Dent started with Lockhart Power in 1913. Tribble joined the utility in 1948.

Richard D. Green has been elected assistant secretary-treasurer of the National Association of Electric Companies, Washington, D. C. Green has been on the staff of the association since 1946 as research assistant and librarian, having formerly been with the Library of Congress.

•

Weston Names Barnes Head of Sales Division

Philip Barnes, general sales manager of Weston Electrical Instrument Corp, Newark, N. J., has been promoted to director of the sales division. The company also appointed Hubert M. Ricks as general sales manager to succeed Barnes.

PHILIP BARNES

Barnes has been with Weston for 16 years. Following his return from active duty in the Navy during World War II, he became advertising manager in 1947. He was appointed general sales manager in 1950.

Ricks, who joined Weston 26 years ago, is former manager of aircraft instrument and tachometer sales.

Hartford Electric Light Appoints Derrick a VP

Charles L. Derrick, assistant vice president of Hartford (Conn.) Electric Co, has been elected vice president. He succeeds Dr Fred D. Knight who has retired.

The company also appointed Dwight Douglass manager of the production department, formerly the manufacturing department.

Derrick joined the Hartford company in 1942 as an assistant engineer and later became superintendent of engineering. In 1950 he was appointed assistant to Knight, who was then vice president in charge of operating departments. Since July, 1951, he has served as assistant vice president. Prior to joining Hartford Electric Light, he worked for 19 years with the Public Service Electric & Gas Co of New Jersey.

C. L. DERRICK

Douglass, who joined the company in 1920, has been superintendent of power since 1941. His work largely has been in connection with generating plant operation.

Knight started with Hartford in 1941 and six years later was made vice president in charge of operations, engineering, and construction. Before joining the company, he was employed by the Boston Edison Co as a superintendent of production.

•

Marvin A. Paulin, assistant residential sales manager for the Kansas City Power & Light Co, has been named manager of the residential sales department. Paulin, who joined the company in 1929, succeeds **Ernest S. Stephens,** who has resigned after 20 years service with Kansas City P & L to devote his time to private business. **Herbert E. Craft,** formerly a sales supervisor, succeeds Paulin as assistant residential sales manager, and **James E. Jackson,** also a supervisor, becomes an assistant to Harry C. Hayman, assistant manager in charge of dealer contacts.

Dr Kent R. Van Horn, associate director of research for Aluminum Co of America since 1950, has been named director of research. Van Horn succeeds **Dr Francis C. Frary,** who has retired. The new director joined Alcoa in 1929 as a research metallurgist of the Cleveland division of the Aluminum Research Laboratories. In 1945 he became chief of the division and in 1949 was made assistant director of research at Cleveland. After joining Alcoa in 1918, Frary organized Aluminum Research Laboratories at New Kensington, Pa.

Don H. Anderson has joined BullDog Electric Products Co, Detroit, Mich., as advertising and sales promotion manager. Prior to joining BullDog Electric, he was advertising manager of Kuhlman Electric Co. He has been in the advertising field for over ten years, having been associated with Dow Chemical Co and Duo-Therm Division of Motor Wheel Corp.

Dr Lauriston C. Marshall has been appointed director of Link-Belt Co's new Physical Testing and Research Laboratory at Indianapolis, Ind. Marshall has been professor of electrical engineering at the University of California at Berkeley since 1937. He had charge of the High Voltage Laboratory and was head of the Microwave Laboratory operated at Berkeley.

OBITUARY

Robert W. R. MacGregor, 53, joint secretary of the Quebec Hydro-Electric Commission since 1945, died at Montreal Jan. 19.

Herbert M. Burlington, formerly assistant secretary and auditor of the former Columbus Railway, Power & Light Co, died Jan. 14 at Columbus.

Walter F. Maier, 43, assistant Ann Arbor (Mich.) district manager for the Detroit Edison Co, died Jan. 21 at Ann Arbor. He joined the utility in 1930.

SAVE MAN HOURS—REDUCE OUTAGES

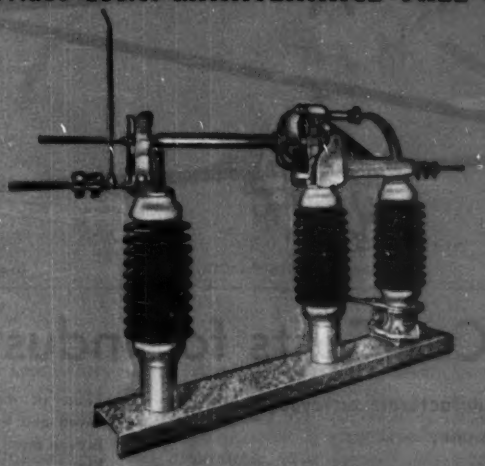
With the NEW KEARNEY

Group Operated

Rotating Insulator Type

DISCONNECT SWITCH

provides Cooler MAINTENANCE-FREE Operation



Any unit that helps keep the meters turning and reduces the man hours required to keep it operating is worth investigation by *any* power company.

Here are just a few of the advanced design features that make this switch so desirable today. (For more detailed information write for bulletin 8-33.)

1. Heavy beryllium copper spring contacts with silver overlay at *both* ends of blade.
2. Fully adjustable to compensate for any changes in switch mounting structure.
3. Positive current path to blade through blade contacts at *both* ends of switch.

With this switch dependable performance under every variety of weather and operating conditions is assured.

JAMES R. KEARNEY CORPORATION

4226-42 Clayton Avenue • St. Louis 10, Missouri

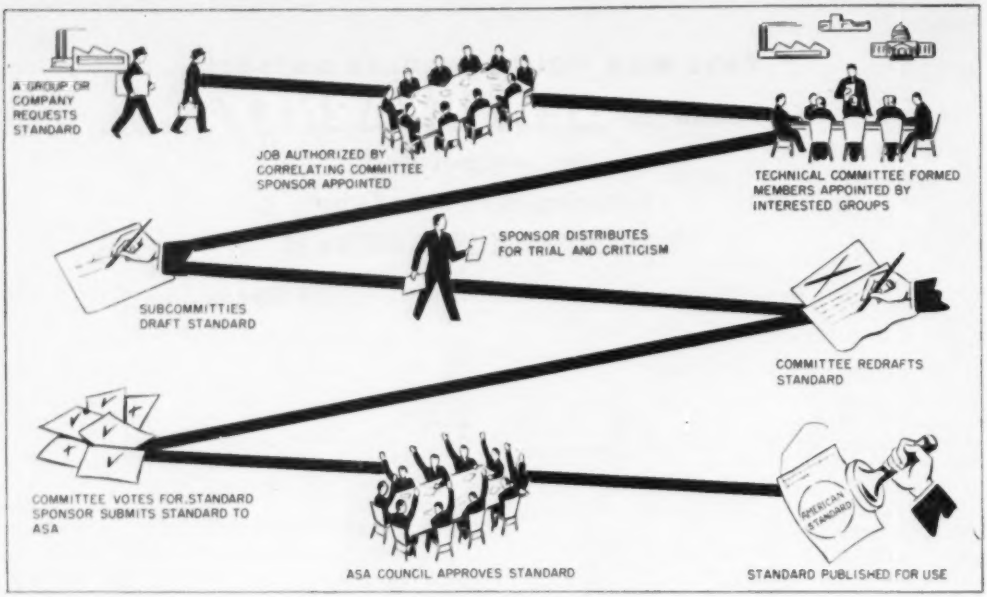
Canadian Plant: Guelph, Ontario

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO.

KEARNEY Gives a Little More for a Little Less

Through Engineering

ADOPTING A STANDARD—SECTIONAL COMMITTEE METHOD


A GROUP OR COMPANY REQUESTS STANDARD
JOB AUTHORIZED BY CORRELATING COMMITTEE SPONSOR APPOINTED
TECHNICAL COMMITTEE FORMED MEMBERS APPOINTED BY INTERESTED GROUPS
SPONSOR DISTRIBUTES FOR TRIAL AND CRITICISM
SUBCOMMITTIES DRAFT STANDARD
COMMITTEE REDRAFTS STANDARD
COMMITTEE VOTES FOR STANDARD SPONSOR SUBMITS STANDARD TO ASA
ASA COUNCIL APPROVES STANDARD
AMERICAN STANDARD
STANDARD PUBLISHED FOR USE

Standards Cut Costs for Industry

. . . Utilities and manufacturers surveyed by ASA report sizable savings in time and money

Standardization is saving money for electric utilities and electrical equipment manufacturers. The exact total isn't known, but it is sizable. This is evident from a survey made by the American Standards Association.

The survey results have been published in a 32-page booklet entitled, "Dollar Savings through Standards." Twenty-five of the case studies are those of companies in the electrical industry and in public utilities. The 140 case stories published cover 81 industries and industrial products.

Some 2,100 ASA company members were enlisted to supply information from their own standardization experiences and techniques. The result is the first body of measurable proof in terms of dollars or percentages of net savings and economic benefits attributable to standardization.

Here are some excerpts of interest to the electric industry:

Kansas City Power & Light Co . . . On Aug. 1, 1950 we standardized on meter test blocks. On purchases since then our savings have been $3,280. By adopting EEI-NEMA Specification TDJ-19 1949 for mounting brackets, lightning arrester manufacturers at last made it possible to replace a damaged arrester with one of another make without the labor cost of replacing the bracket.

Stone & Webster Engineering Co . . . The adoption of ASME-AIEE Preferred Standards for Large Turbine Generators has enabled manufacturers to make tremendous savings in engineering costs of producing large turbine-generators. These savings have been passed on to the consumer.

An even greater saving of time, effort, and money accrues to the designing engineer.

We venture to say that at least $1 million has been saved in the cost of engineering and equipment by our clients since V-J Day by our widespread use of "preferred standards" turbine-generators. This does not include any attempt to capitalize the value of the time which has been saved and which, in many instances, is even more important than the dollar saved.

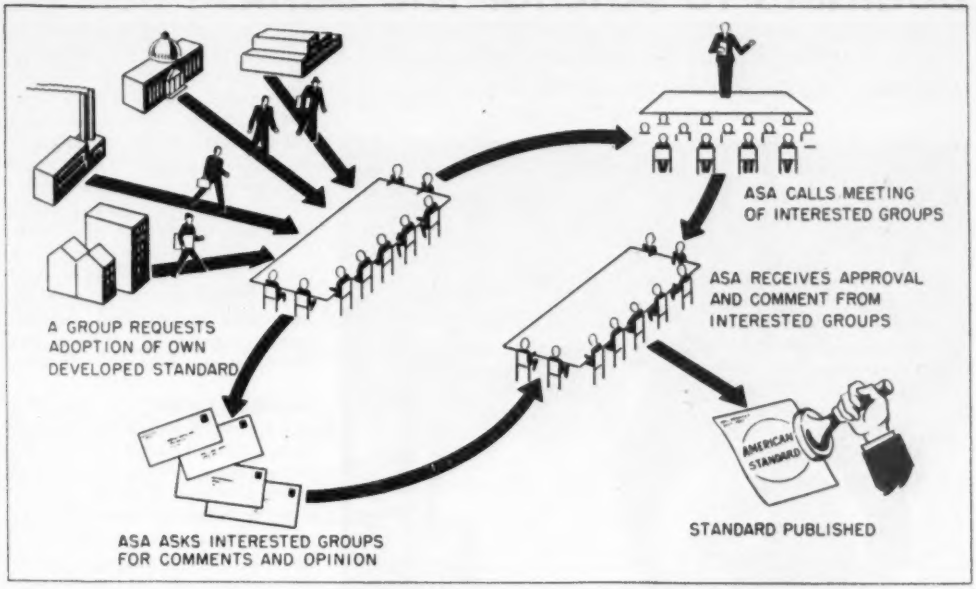
Consumers Power Co . . . The effort of the EEI-NEMA Joint Committee which resulted in distribution transformer standards that are now embodied in ASA Standard C57 clearly made a contribution which resulted in economic gain for all concerned.

The records of price movements in this equipment as compared to those for large power transformers (which inherently are not so susceptible to standardization) clearly indicate that the advent of standards in distribution transformers brought economies in manufacturing which materially have restrained costs—and, hence, prices.

Carbone Corp . . . Many standards have been made for the carbon brush industry. These have resulted in great savings to members of the industry in the following ways:

1. Procurement of copper cable, lugs, and clips. Larger quantities can be purchased because of reduced number of standard sizes.

ADOPTING A STANDARD—EXISTING STANDARDS METHOD


A GROUP REQUESTS ADOPTION OF OWN DEVELOPED STANDARD
ASA ASKS INTERESTED GROUPS FOR COMMENTS AND OPINION
ASA CALLS MEETING OF INTERESTED GROUPS
ASA RECEIVES APPROVAL AND COMMENT FROM INTERESTED GROUPS
AMERICAN STANDARD
STANDARD PUBLISHED

2. Some simplification in manufacturing is expected in the near future with the adoption of a joint AISE and AIEE Standard on Mill Motor Brushes.

3. Elimination of disputes concerning tolerances since standard tolerances have been adopted by the industry.

4. Allowance for overage and underage in shipments varied to the extent of 5 to 10%.

5. Somewhat reduced inventories of material.

All the above have resulted in considerable savings; but since many of these standards have been in existence for a long time, it would be impossible to evaluate the actual dollar saving.

One of the most detailed replies in the survey was supplied by **Westinghouse Electric Corp.** This was received too late for publication.

The following specific cases of savings resulted from apparatus standards with regards to ratings, performance characteristics, dimensions, and mechanical features of the classes of apparatus noted:

Steam turbine-generators (rated 11,500 to 90,000 kw AIEE-ASME standards) . . . Approximately two-thirds of units being purchased in these ratings are of the standardized design. Approximately 40% is saved by purchaser of a standard unit by comparison with a non-standard unit. Other savings result in plant layout and construction. The capacity of the industry to build turbine-generators was materially increased by the standardization because engineering and drafting time was reduced. More time was made available for research and development which has resulted in more advanced designs.

Transformers . . . A saving of 6% of more can be made by buying standard instead of non-standard units. This is the result of lower costs made possible through volume production of identical parts. Standardization stabilizes the market making larger shipping stocks feasible and thus permitting better service to users. Because of the standardized dimensions and mounting arrangements faster and cheaper installations can be made.

General Electric Co report on standardization also was received too late to be included, read:

We are submitting the following resistor standardization program as a good example of variety reduction, interchangeability, and lower over-all cost.

In previous years our tube resistors were specifically designed for each type of application. Many shapes, mountings, connecting means, and a large number of values of resistance were created.

This line has now been completely standardized. The main points contributing to the program are reduction of body sizes, reduction in variety of mounting and connecting means, and limiting of resistance values to definite steps.

Not including value of resistance as a variable, the number of assembly groups has been reduced from 1,280 to 110.

The basic tube resistor now consists of tube body, resistance wire, connecting terminal, and enamel coating. These basic assemblies are stocked in eight wattage ratings and in the resistance values where usage dictates.

The mounting feet, ferrules, and porcelain ends are also stocked. To fill a specific order the proper resistance units are taken from stock, the mounting means added, and the completed unit is ready for shipment.

The annual saving resulting from this program is estimated to be approximately $37,000. But GE has similar programs in many other lines which have led to even greater savings.

Boulders to Anchor the Banks . . .

. . . of the Columbia are being put in place to prevent land slides along the river downstream from Grand Coulee

LARGE CRANE places armor rock at the toes of Columbia River bank slopes below Grand Coulee Dam. Rocks being used for the bank-stabilization project weigh from 6 to 40 tons

GRANITE ARMOR ROCK for the stabilization project was quarried on the left bank of the river about one mile below the dam. Dump trucks hauled the massive rocks to the site

Placing of heavy armor rock on the banks of the Columbia River and at a few locations in the river channel downstream from Grand Coulee Dam will continue through the winter in the hope of having the current bank-stabilization project completed before the 1952 high water season, according to Bureau of Reclamation officials.

Near the dam, rocks placed at the toes of the river bank slopes range from a 6-ton minimum to 30 or 40 tons each. Farther from the dam weights range from 4½ to 6 tons, and below that area from 3 to 4½ tons.

Fluctuation Limited . . . Fluctuation of river level below the dam in connection with load-factoring at the Grand Coulee power plant is limited to 4 ft in 24 hours (EW, Dec. 3, 1951, p 96) to minimize land slides and property damage along the river banks. An extra foot of range is allowed when not over one hour in duration, to permit higher generation through peak load periods. That range in river level permits a reduction of 500,000 to 600,000 kw in station load between the daily peak and the minimum night load.

Numerous Slides . . . In the 18 years since construction work was started at Coulee Dam, numerous slides of the old lake bed material along the river have occurred. Some of them were directly related to excavations at the bases of slopes but many were the result of too abrupt and unusual reductions in water level. Under natural flow conditions reductions in river levels after each annual peak were at the rate of 2 ft a day or less, while artificial reductions due to load factoring have been greater in range and frequency and therefore more destructive. Seasonal increases in ground water further aggravate the condition.

Bank stabilization devices have included drainage tunnels and wells to intercept ground water percolation, as well as heavy riprapping of river banks. After completion of the current conservation program an increase in the 4-ft range limit may be possible without danger to river banks and power installations near the dam, but damage to river banks farther down stream are to be expected, even with the 4-ft limit in force.

CASH PRIZES totalling $1,350 were awarded to individuals and groups for winning entries in a high school home economics contest

Contests Spark Appliance Selling

Chicago Electric Association uses them effectively to keep dealers enthused and to uncover ideas for promotional activities

"Competition is the life of trade" is the basic thought underlying the promotional activities of the Chicago Electric Association. Typical of how it is put to work are the four instances reported here.

Sales Booster Contest. . . . Purpose was to bring forward selling ideas for dealers and contractors to be used in the 1952 promotional program of the Association. Prizes of $100 each were offered for the best sound practical ideas for boosting sales in six classifications — electric housewares, electric ranges, electric home laundry, radio and television, adequate wiring and electric home modernization, and industrial and commercial electrical modernization. Also there was a grand prize of $400 for the best of the six class winner entries.

Electric Housewares . . . A pocket-size dealer handout called a "Select-O-Gift," submitted by Charles Thompson, Graybar Electric Co, was the winning idea in this class. It consists of three cardboard discs, large, medium, and small, held together by a center eyelet on which the discs can be turned. Around the edges of the two larger discs are listed the 14 recognized gift-giving occasions of the year. The front disc has a cutout window through which appear lists of electric gifts appropriate for the particular occasion. Turning the back wheel brings into view suggestions of gifts for "him," and gifts for "her" show up when the middle disc is rotated. Thus for Christmas, birthdays, weddings, anniversaries, etc, several suggestions for gifts are disclosed.

(*Continued on page* 39)

FREE GIFT WRAPPING was one of the many ideas for stimulating electric housewares sales that won $200 for Mrs. Sophia Weiss of the Weiss Appliance Co

BEST WAY to use her prize money is to buy an electric range, B. G. Harrington, manager of the Electric Cooking Institute, tells Grace E. Keyes, winner in adequate wiring contest

Facts from
NEW YORK

"'CSP' Transformers save us $16,000 a year"

"92% fewer outages . . . savings of approximately $16,000 a year . . . that's the record of 'CSP' Transformers compared with conventional types of transformers on our lines," says a leading utility in New York State.

"Records recently completed, covering a period of years, show that burnouts from lightning took 0.784% of the installed capacity of conventional transformers, compared with 0.062% for the 'CSP' Transformers on our system."

Installation and maintenance costs for Westinghouse "CSP" (Completely Self-Protecting) Transformers are always lower, because complete protective equipment is built in, not separately mounted. A two-year survey of Electric Light and Power Companies shows the following:

NATIONAL AVERAGES

	"CSP"	Conventional
Installation Costs	$13.87	$24.74
Burn-out Rate	0.257%	1.005%
Fuse Outages	None	5.64% @ $6.52 per outage
Lead Checks	Automatic	12.8%
Breaker Reset	1.02%	None

If you'd like to check your own costs against these national averages, ask your Westinghouse representative for Booklet 4247-B, "Transformer Costs and Their Relation to Profits". Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

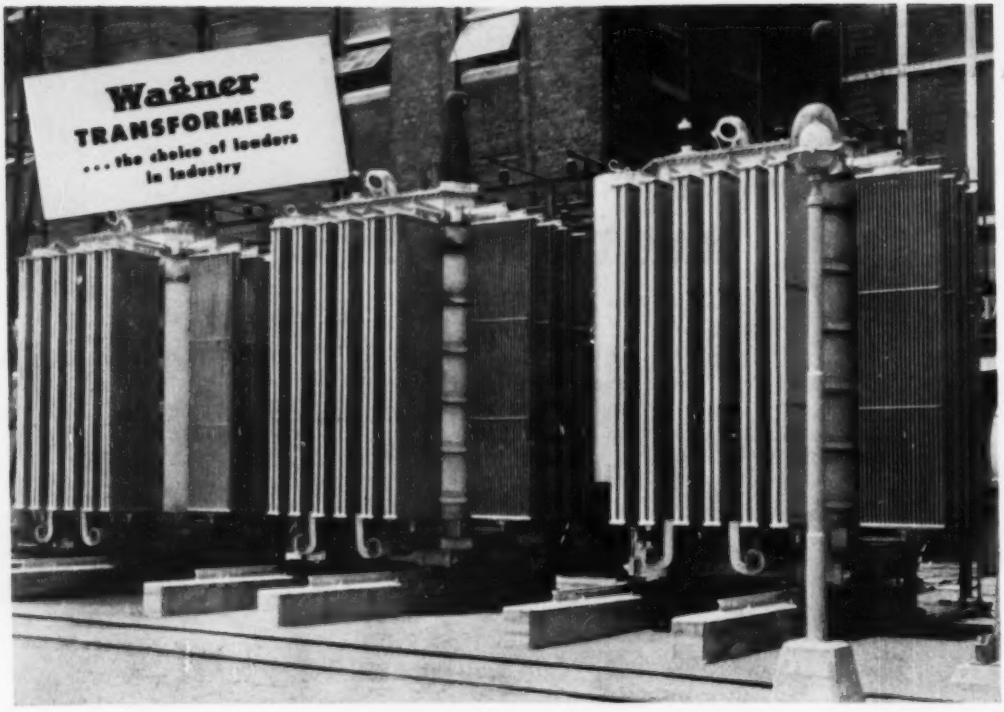
"CSP" devices . . . originated and patented by Westinghouse

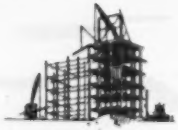
YOU CAN BE SURE... IF IT'S

Westinghouse

"CSP" DISTRIBUTION TRANSFORMERS

J-70392





it's booming time down South...

Today, the South *is* booming. Its rapid development and rising importance offers a challenge to all industry. The South has room—it has resources—and it has unlimited facilities for production.

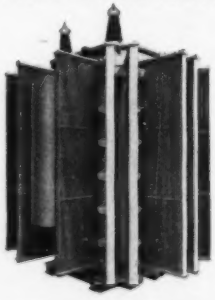
Alabama Power Company plays an important part in this picture by supplying the vital electric power that makes industrial development possible.

Wagner transformers perform an essential job in this power supply operation. A typical example is shown above . . . these Wagner Power Transformers are installed at the Chickasaw Steam Plant of Alabama Power Company, where they step up the voltage of a 50,000 kilowatt turbo-generator to 110,000 volts for transmission to industrial centers.

Wagner transformers are used by a great many power companies and by their industrial customers, as well, because Wagner Transformers have a reputation for unfailing dependability—backed by sixty years of service to the power industry.

Wagner engineers are qualified to specify the correct transformer for *your* requirements. Consult the nearest of our 31 branch offices, or write us.

Wagner Electric Corporation
6456 PLYMOUTH AVE. • ST. LOUIS 14, MO., U.S.A.



Wagner Electric Corporation
EST. 1891

ELECTRIC MOTORS • TRANSFORMERS
INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

WT51-5

Contests Spark Selling

(*Continued from page* 35)

Electric Range. . . . Winner in this class was Vern J. Hedstrom, Commonwealth Edison, with several suggestions for the promotion of ranges through the Association's Electric Cooking Institute.

1. Feature the Institute not just as a display room for ranges, but also as a place associated with the best in cooking.

2. Include a "Jane Foster Tested Recipe" in each newspaper advertisement. "Jane Foster" has been publicized as the recognized electric cooking authority in Chicago.

3. Compile a "Chicago Cook Book" by means of a recipe contest. After being tested by the "Jane Foster" staff, recipes would be included in the book over contributor's name. The first few pages, well illustrated, would summarize the advantages of electric cooking.

Electric Laundry Equipment (Dryer). . . . There are three parts to the winning entry submitted by Robert Ligare of the Chicago Lighting Institute.

1. An advertising slogan, "Today can be wash day with an electric clothes dryer," printed continuously on a page from an almanac.

2. A "Touch Exhibit" for windows and store counters, one towel dried in an electric dryer and one on a clothes line.

3. Publicizing the elimination of tedious work by allowing a cash trade-in for clothes pins and clothes lines and using these materials for display purposes.

Radio-Television. . . . Everyone enjoys being an expert, and television is no exception, said John Emerson formerly of Zenith Radio, in his winning suggestion for TV studio parties to be sponsored by regional groups of appliance dealers for hard-to-close TV prospects.

Adequate Wiring—Home Electrical Modernization. . . . The winning idea of Grace E. Keyes, Commonwealth Edison, was to quote a given price range of from $50 to $79.50, or whatever can be figured out, for an additional electric circuit to take care of the requirements of kitchens in older homes. This would take the load off the other circuits which could be used for the rest of the house. It was further suggested that additional outlets could be charged for at a nominal figure, say perhaps $7.50 each.

Most people hesitate to call an electrician because they think the cost of a complete rewiring job would be too expensive, but the suggestion of an additional circuit would open the door for other improvements.

Industrial Commercial-Electrical Modernization. . . . An outline for a comprehensive advertising campaign to educate large and small industrial and commercial users of electricity on the advantages of complete electrical facilities as a means of eliminating production, maintenance, and manpower problems, won the award for William Dexter, General Electric Co.

The grand prize of $400 was won by Charles Thompson for his entry in Electrical Housewares. Presentation was made at the annual dinner of the Association January 23.

Gift Merchandising. . . . Another contest staged by the Association was to find the best all around promotion of electric housewares as gifts for Christmas and other occasions.

Mrs. Sophia Weiss of the Weiss Appliance Co won the $200 first prize and second prize of $100 went to John F. Beranich of Emergency Radio and Appliance Co. A third prize was awarded to Russ Wessberg of the Wigdahl Electric Co.

A "Christmas Morning" window display was the outstanding feature of the winning entry. A large selection of electric housewares were grouped around the tree in a typical holiday setting with a large sign: "Why guess? Make it an *Electrical* Christmas!" There were also excellent inside store displays and a gift wrapping service. Also the winner showed originality in advertisements run in community newspapers.

Interested Teen-Agers. . . . From 673 students in 35 participating schools, 122 entries were received in a high school home economics contest sponsored by the Association's Electric Cooking Institute. At an awards luncheon, December 14, first and second prizes of $150 and $100 were given to students submitting winning entries in the essay, radio script, and poster divisions.

In another phase of the contest, awards of $150, $100, and $50 were given for first, second, and third prize for winning oven meals and skits on the subject "A Teen-Ager Tells Mom About Electric Cooking."

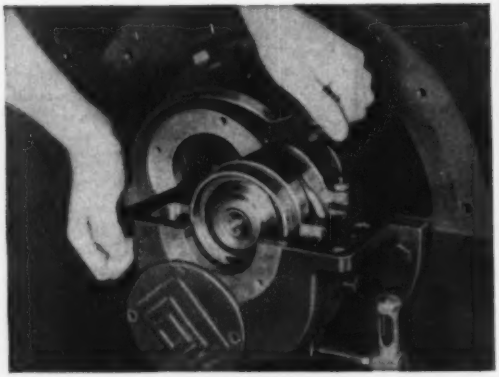
Keeping Dealers on their Toes. . . . To stimulate dealer selling effort in the Association's fall and winter electric blanket campaign, the "Mystery Shopper" idea was used. Mystery shoppers visited stores of dealer members to find the best dealer sales presentations on electric blankets. Two winners were selected each day for 30 days and each winner received a $25 award. Daily bulletins were issued announcing names of winners and summarizing salient sales points used by them.

General Electric Co photo

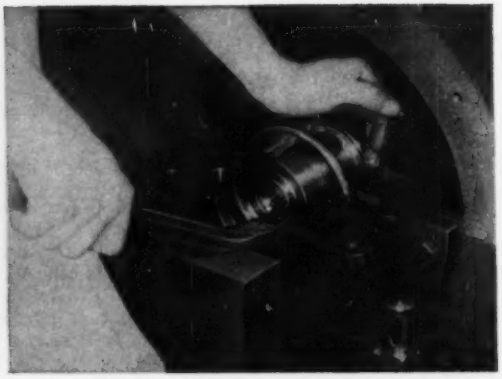
Mercury Vapor Now Lights Peoria

Fifty-six city blocks of Peoria, Ill., have been illuminated by 403 new street lights. The units are mounted on 6-ft upsweep brackets at a height of 26½ ft on steel poles. Spacing is 72½ ft, staggered. Equipped with 15,000-lumen, 6,000 hour AH1 lamps, the new luminaries provide an average illumination of 1.8 ft-c, which is approximately seven times that of the former lighting.

TO GET AT A BEARING all you remove is the bearing cap ...IN ELLIOTT MOTORS!

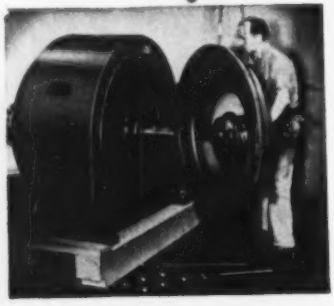


The bracket as well as air directing baffles stay put—you don't need to touch any part of them. The photo above shows why. As soon as you raise that bearing cap, there's the bearing, completely accessible. The top half of the bearing shell can then be lifted off.



To remove the bottom half of the bearing shell, you simply take the weight of the rotor off it, roll it round to the top of the shaft, and lift it out from under the oil ring. There's a boss on the end of the shaft to take your pinchbar. That's what it's there for—you can't hurt it.

TO INSPECT STATOR WINDING— it's almost as easy TO REMOVE A ROTOR



■ Simply remove the capscrews from the bracket on the non-drive end, and swing the bracket off and away from the stator. The bracket is a single assembly—baffles and all. It comes off in one piece—no mess of parts to fuss with.

On the drive end, first remove both halves of the bearings as above. Next, remove four cap screws securing the lower-bearing housing and lift clear of the bracket. Then if it is desired to pull the rotor, it can be removed very simply through the non-drive end with the coupling half still in place on the shaft, since the coupling half will clear the opening in the end bell on the drive end. If it is desired to inspect the stator winding, the bracket can be removed over the coupling if the rotor is still in place.

It's a new way to build motors, providing a new low in maintenance and a new high in performance. Elliott Fabri-Steel motors, in a variety of types, including outdoor designs, are built in sizes from 200 hp up. Write for bulletins on the motors you need.

Elliott FABRI-STEEL MOTORS AND GENERATORS

ELLIOTT COMPANY

DEPARTMENT EW

RIDGWAY DIVISION • RIDGWAY, PA.

Plants at: JEANNETTE, PA. • RIDGWAY, PA.
AMPERE, N. J. • SPRINGFIELD, O. • NEWARK, N. J.
DISTRICT OFFICES IN PRINCIPAL CITIES

L-819

THIS STATION, located atop a hill near Pompey, N. Y., is the mid-point in a microwave radio relay system operated by General Electric Co engineers between Electronics Park, Syracuse and DeRuyter, N. Y. It relays signals from the park to DeRuyter and vice versa

GE Sets Up Microwave System

General Electric Co engineers at Electronics Park, Syracuse, N. Y., have built and are operating experimentally a 60-mile multi-channel microwave relay radio communications system. Purpose of the system is to help develop and test new and improved communications equipment.

Here is how the system works: Signals are beamed from an antenna atop the laboratory at the park to a relay station 15 miles to the south near Pompey, N. Y. This station, unattended, relays them to another station at DeRuyter, N. Y., which is located on a hill 15 miles farther south. There they are automatically placed on another channel, sent back to the Park via the Pompey station, and fed into a loudspeaker in the laboratory. The 60-mile round trip takes only about three ten-thousandths of a second.

The round trip set-up eliminates the need for operators in the field who ordinarily would be asked to check reception at the two relay points. Hearing their voices return indicates to engineers that all is well along the route.

Since microwave signals travel in straight lines like radar signals, sending and receiving antennas must be within sight of each other with their separating distances governed by the terrain between them. Signals can be relayed any number of times to cover longer distances.

Similar microwave systems are now being used by public utilities to provide private communications along lengthy electric power lines. As many as 24 separate conversations can be handled simultaneously by GE microwave systems. Some of these channels, if desired, can be used to carry signals which can control electric power stations. GE engineers have pointed out that these systems are less prey to ice storms and landslides than are land lines.

GE is now constructing a second system between Electronics Park and a point near Utica, N. Y., providing a round trip circuit of 80 miles.

•

Copper Stocks Higher; Greater Output Is Seen

Stocks of refined copper held in the United States by members of the Copper Institute at the end of 1951 amounted to 71,528 tons, 22,488 more than that held on Dec. 31, 1950.

Deliveries to domestic fabricators last year were 1,367,787 tons, against 1,371,464 in 1950. Refined output was 1,199,784 tons compared with 1,270,768.

Outside the United States stocks on Dec. 31 were 152,203 tons, 12,284 tons above the 139,919 at the end of 1950. Deliveries last year increased to 1,013,450 tons from 898,601 in 1950. Refined production was 1,225,-018 tons against 1,127,329.

Despite declines in 1951 below 1950 of deliveries and refined output of copper, greater output is expected. The long-term outlook calls for major boosts in output of the metal, according to James J. Russell, chairman of Revere Copper & Brass, Inc.

"Projects for increased production are under way in six major world producing areas which promise the addition of 400,000 tons a year to annual capacity. These increases will not be fully effective until 1955, but each of the next four years should see some net additions to capacity," Russell added.

Russell has described requests from Washington to substitute aluminum for copper "in the main unsound." Some of the substitutions advocated were entirely impractical, he added, because of the different characteristics of the metals. Others, he said, could be effected only over a long period and at extreme cost.

"The prospective expansion of copper production appears adequate to cover a normal rate of growth in copper consumption, and it is not hard to

imagine situations developing wherein the shortage could be turned into surplus almost overnight," Russell stated.

•

Appliance Outlook for '52 Uncertain, Nance Says

The forecast for the appliance manufacturing field in 1952 is foggy, James J. Nance, president of Hotpoint, Inc, has predicted. His prediction was made before a group of business and trade editors at a meeting held in Chicago in conjunction with recent appliance shows in the Furniture Mart and the Merchandise Mart.

Nance said that although it is difficult to evaluate the extent of defense dislocation, appliance production will be about 80% of 1951 unless there is an increase in material allocations. The reduction in appliance production has not been as great as the withdrawal of many materials because there have been changes in material requirements through new manufacturing developments, he added.

The industry, he pointed out, generally is in a healthy condition and there is no major inventory problem for the industry as a whole. However he warned, "Don't sell the production ability of this country short."

Hotpoint alone, Nance revealed, has spent $60 million for plant expansions since the war. It now has ten plants and has purchased the site for another, which will be constructed as soon as conditions permit. This last plant is expected to complete the Hotpoint "family of plants." Nance said that most major manufacturers are working toward a family of plants for turning out a family of products.

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RFC Boosts Tin Price

The Reconstruction Finance Corporation has boosted the price of tin metal it sells to the industry by 18½¢ up to $1.215 a lb. RFC, sole importer of tin, has charged $1.03 a lb since last August. The boost is the result of a recent U. S.-British tin agreement.

Metal Prices
Jan. 28, 1952

COPPER, Conn., V., lb	$ .24½
LEAD, N. Y., lb	.19
ZINC, prime Western, E. St. Louis, lb	.19½
TIN, Straits, quot. N. Y. lb	1.21½
ALUMINUM, ingot, base price, lb	.19
NICKEL, base price, lb	.36½
STEEL, billets, Pitts., ton	56.00
STEEL, scrap, No. 1 heavy, Pitts., ton	45.00

NEW ELECTRICAL CONSTRUCTION

A weekly selection of U. S. electrical construction projects announced by private and government utility systems involving more than $70,000. Also listed are major industrial and construction jobs where electrical work is indicated or implied

UTILITIES

Proposed Construction

Colorado—Bureau Reclamation, Dpt. Interior, Loveland, installing connections between relocated section of Estes-Greeley 115 kv transmission lines and existing section of line at Flatiron, Colorado-Big Thompson Proj., Spec. 704C-236. L. N. McClellan, Bldg. 1A Denver Federal Center, Denver, ch. engr.

Fla., Cocoa—City, electric power plant. Approx. $250,000.

Ga., Albany—Dpt. Navy, Officer in Charge of Construction, Box 365, Naval Base, S. C., electrical distr. sys. at Marine Corps. Depot of Supplies, NOY 70661.

Ill., Chicago—General Service Admin., Federal Supply Service, 528 Courthouse, power plant alterations, U.S.P.H. Service Hospital.

Ill., Chicago—Commonwealth Edison Co., 72 W. Adams St., sub-station addn., Washington Park Station, $200,000. Shaw, Metz & Dolio, 205 S. State St., consult. engrs.

Ill., Rantoul—U. S. Eng., 520 Merchandise Mart, Chicago, Zone 54, 69 KV electric sub-station consisting of six 2,000 kva transformers and two 750 kv. voltage regulators, Chanute Air Force Base, Eng. 11-032-52-38. Plans deposit $10.

Ky., Fort Campbell—Dpt. Army, Purchasing & Contracting Office, Fort Campbell, rehabilitation of exterior overhead electric distr. sys., Campbell Air Force Base, Serial No. 15-056-52-87.

Mass., Quincy—City, P. Wks. Dpt., City Hall Annex, power plant, $500,000. Plans deposit $50, refundable $25, Coletti Bros., 687 Boylston St., Boston, archts. Office of Hollis French, 210 South St., Boston, heating engr.

Mo., Cameron—Northwest Electric Power Co-operative, Inc., Cameron, soon lets contract, power materials, supplies and equip. $500,000. Lutz & May, 819 Finance Bldg., Kansas City 6, Mo., consult. engrs.

Mo., St. Louis—Graybar Electric Co., 2642 Washington Ave., Zone 3, 187,545 sq. ft. area covering plant, warehouse, distr. center, offices, etc. on site fronting 488 ft. on Clayton Ave. by depth of 384 ft. on Sarah St. $150,000.

Montana—Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver Federal Center, Denver, Colo., furnishing, del. f.o.b. cars shipping point or f.ob. cars Louisville, fabricated structural steel for 115-kilovolt switchyard at Canyon Ferry Power Plant. Helena-Great Falls Div., Canyon Ferry Unit, Missouri River Basin Proj., Spec. DS 3642. L. N. McClellan, ch. engr.

N. Y., Wassaic—Bureau Contracts & Accounts, Albany, electrical work for turbine generator unit, Power House, Wassaic State School. Plans deposit $30.

N. C., Gaston—Virginia Electric & Power Co., 7 and Franklin Sts., Richmond, Va., hydro-electric power plant and dam on Roanoke River. $27,000,000.

Oklahoma—U. S. Eng., Box 61, Tulsa 2, Okla., switchyard and power plant equip. for Ten Killer Dam. $225,000.

Okla., Anadarko—City, City Hall, 1,250 h.p. diesel engine generator for light plant. $200,000. K. C. Frisch, c/o owner, engr.

Oregon and Washington—Bonneville Power Admin., 827 N.E. Oregon St., Portland, Ore., construct Columbia River Crossing, Westport-Cathlamet 115 kv line, Inv. 6276, Clatsop and Wahkiakum Counties. Plans deposit $25.

Oregon—Bonneville Power Admin., 827 N. E. Oregon St., Portland, construct LaGrande Sub-station, Inv. 6262, Union Co. Plans deposit $25.

South Dakota—U. S. Eng., 1709 Jackson St., Omaha, Neb., turbines for Gavins Point Dam.

Ont., Toronto—Ferranti Electric Ltd., Mount Dennis, factory expansion. Approx. $100,000. Ewart, Armer & Byam, 2453 Bloor St. W., Toronto, consult. engrs.

British Columbia—British Columbia Power Comn., Vancouver, power development at Quesnel to supply new pulp mill, $16,000,000.

Low Bidders & Contracts Awarded

Florida — Perini-Walsh-Mills & Blythe Bros., Box 308, Chattahoochie, Fla., Lit $13,901,379, gated spillway, power house and switchyard at Jim Woodruff Dam on Apalachiola River. U. S. Eng., P. O. Box 1169, Mobile 7, Ala. Bids Jan. 16.

Calif., Point Mugu—George W. Carter Co., 1721 W. Olympia St., Los Angeles, Calif., CA. $1,783,588, construct supply, public works, office, shops, refrigerated storage bldg., utilities and paving at U. S. Naval Air Missile Test Center, Spec. 32575. P. Wks. Office, U. S. Naval Air Missile Test Center, Point Mugu, Calif. Bids Dec. 18, awarded Jan. 14.

Ill., Chicago—Hansell-Elcock Co., 485 W. 23 St., Chicago, Ill. CA $500,000. 2 factory addns. Delta Star Electric Co., Div. H. K. Porter Co., Oliver Bldg., Pittsburgh, Pa. Awarded Jan. 16.

Mich., Crystal Falls—C. R. Meyer & Sons Co., 50 State St., Oshkosh, Wis. CA $638,000. Power plant and dam. Wisconsin-Michigan Power Co., Appleton, Wis. Mead & Hunt, 550 State St., Madison, Wis., archts.

Montana—Montgomery Electric Co., 2375 N.W. Thurman St., Portland, Ore. CA $821,839. Inv. 6229, Schedules 1 and 3. Hot Springs-Anaconda 230 kv line, Sanders, Lake Missoula, Granite, Powell and Deer Lodge Counties. Bonneville Power Admin. 827 N.E. Oregon St., Portland Ore. Awarded Jan. 17.

Nebraska—Line Constructors, Benson Bldg., Sioux City, Ia., CA. $314,190, 295.8 mi. rural distr. lines, Blaine, Custer, Sherman, Lincoln and Logan Counties. Custer Public Power Dist., Broken Bow, Neb. Bids Jan. 8.

Tex., Rockdale—Texas Power & Light Co., Interurban Bldg., Dallas, Tex. Owner Builds. $345,000, 110 mi. 135,000 volt electric transmission line.

Tex., San Antonio—Handy Andy Community Stores, Inc., 601 N. Cherry St., San Antonio, Tex., Purchase and Hire. $90,000, bakery unit; $90,000. Refrigeration maintenance unit.

INDUSTRIAL, COMMERCIAL & PUBLIC BUILDINGS

Proposed Construction

Ill., Maywood—Baptist Home Hospital, 315 Pine St., plans by E. E. Roberts & Elmer C. Roberts, Inc., 201 N. Wells St., Chicago, hospital and rest home, $2,500,000.

Mich., Dearborn—Ford Foundation, 2612 Buhl Bldg., Detroit, and Ford Motor Co., 856 Penobscot Bldg., Detroit, plans by Skidmore, Owings & Merrill, 100 W. Monroe St., Chicago 3. Ill., develop 4,500 acres farm land into community with homes, apartments and schools. $200,000,000.

O., Columbus—Ohio State University, N. High St., plans by Howard Dwight Smith, 1950 Arlington St., steel, brick, concrete women's dormitory, extens. of Mack-Canfield Housing unit to be known as "12th Ave. Group." $2,500,000.

Tex., Longview — First National Bank Bldg., c/o C. A. Loftin, pres., Longview, plans by Alfred C. Finn, Bankers Mortgage Bldg., Houston, 16 story bank and office. $2,000,000.

THE RIGHT TOOLS—
right when they're needed

For prompt, efficient completion of any line job, make sure your linemen have the right tools — *right* when they're needed.

And, for the easiest way to obtain this equipment, make it a point to order from Graybar. On a single transaction, you can get pliers, wrenches, shovels, and all the other tools you need for line construction and maintenance . . . safety equipment for hot-line repairs . . . even trailers and splicing carts.

By ordering through Graybar, you save the time and expense of multiple inquiries. You get products that are dependable and give long service-life—products that have been tested and accepted by linemen throughout the nation.

Your local Graybar Representative is a convenient source of information on all of the other materials required for utility pole-line projects. You'll find him well-informed on both availability and usage of the more than 100,000 electrical items distributed by Graybar.

Remember, too, that for special help on difficult problems, an experienced Graybar Outside Construction Specialist is at your service.

Graybar offices and warehouses are strategically located in over 100 cities — a feature that enables us to give you efficient local service on day-to-day orders and often saves valuable time in emergencies. ***Graybar Electric Company, Inc. Executive offices: Graybar Building, New York 17, N. Y.*** 214-92

You get the best of everything electrical
Via GraybaR

IN OVER 100 PRINCIPAL CITIES

SPIRAKORE TRANSFORMERS

GIVE EXTRA YEARS OF SERVICE

Soaked in the flood...

"We cleaned and tested the first few of the newer transformers," said city engineer, Harvey Earp, "and found that no water had gotten in, . . .

"so we just hosed down the remaining Nitrile-sealed transformers, gave them a routine check, and put them back on the lines."

G-E Spirakore* Transformers stay moisture proof!

When the flood hit the city of Osawatomie, Kansas, it completely submerged a number of distribution transformers. Yet service was restored in most areas only a few hours after the water receded.

This speed was possible because of the fine work done by the repair crews . . . *and the water-tight seal on G-E Spirakore transformers.* Although water did leak into some transformers of older design, every one of the Nitrile-sealed Spirakore transformers came through unharmed. The first Nitrile-sealed transformers recovered were cleaned and found undamaged—so the rest were merely washed with a hose, given a routine inspection, and put back in service without an inside tank check. And they are still on the job!

Nitrile Gaskets Used in Every Opening! Not even flood waters could get into Spirakore transformers because every opening—for cover, hand-hole and bushings—gets sealed with a Nitrile gasket. Completely air-tight, water-tight, this sealing eliminates transformer breathing—prolongs the life of both oil and insulation. Because no cement or sticker is used, gaskets can be removed easily—are reusable.

Better sealing is just one of the design features that make Spirakore the finest transformer obtainable. Bulletin GEA-5400 describes many more. If you haven't a copy, write for one today. Address *General Electric Co., Schenectady 5, N.Y.*

**Reg. Trade-mark of General Electric Co.*

"The Nitrile seal," continued the city engineer, "kept our Spirakore transformers air-tight and helped us get our system back in service just a few hours later."

402-117

GENERAL ELECTRIC

FINANCIAL

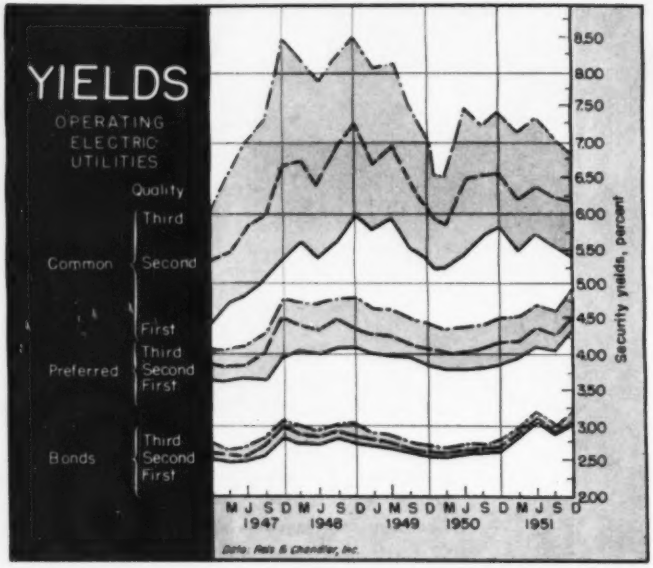
Utility Bond Yields on Rise as '51 Ends

Level at the close of the year is the highest in more than a decade

In the fourth quarter of 1951 the bond market resumed its downward course which began in March but had abated somewhat in the third quarter. The Electrical World indices of yields on typical outstanding bond issues of electric operating companies showed a rise of about .15% in the three months. The level at the end of the year was the highest in more than ten years. The longest term U. S. Treasury bonds, the 2½s due 1967-1972, followed a similar course, rising .13% to 2.75% at the end of December.

Higher Bank Loan Rates . . . The quarter was marked by two increases in the rate charged by commercial banks for short term loans, raising the cost from 2½% to 3% to the best borrowers. This places the cost for short term money approximately equal to the rate for outstanding first quality long-term bonds with maturities averaging over 25 years.

Higher Yields on Preferred Stock . . . Preferred stock yields rose .27% in the quarter, reacting to the major influence on the market of several large new offerings during the period as well as the general course of interest rates. Preferred stock public financing for new money in the fourth quarter totaled $138 million and included the Pacific Gas & Electric Co, Public Service Electric & Gas Co, and Commonwealth Edison Co issues. Only $28 million of new preferred was sold in the first nine months.



COMMON STOCK YIELDS of all qualities go down in the fourth quarter of 1951 as bonds and preferred stock yield of first, second, and third qualities showed marked increases

Common stocks of electric companies gave an outstanding performance during the fourth quarter with yields showing noticeable improvement as prices rose. The Dow-Jones utility average rose 3.4%, whereas the industrial average fell 0.7%.

Common Stock Dividends Up . . . Despite a shrinkage in earnings in 1951 from rising expenses, notably federal income taxes, a number of managements continued to show liberality to their investors by raising the regular common dividend rate or paying extras. There were seven such instances in the fourth quarter compared with six in the third quarter and 13 in the last quarter of 1950. During the entire year 21 companies raised the common dividend rate out of a total of approximately 130 companies.

Financing Higher . . . The pace of financing in the fourth quarter was accelerated after the usual seasonal lull in the summer months. The $448 million of new money raised by public offerings in the last three months of the year was almost four times that raised in the third quarter and twice the fourth quarter of 1950.

Total public new money financing for 1951 of $1,277 million exceeded the $1,032 million of 1950 and approximated the $1,273 million of 1949. This was supplemented by some $118 million of private bond sales and $16 million of privately placed preferreds compared to $205 million and $28 million, respectively, in the previous year.

Public Offering Electric Utility Securities
(Totals Estimated in Thousands of Dollars)

	1951			1950		
	New Money	Other	Total	New Money	Other	Total
Bonds, Notes, and Debentures	766,356	14,359	780,715	547,063	281,387	828,450
Preferred Stocks	165,965	10,000	175,965	214,235	76,934	291,169
Common Stocks	345,364	4,324	349,688	270,767	96,263	367,030
Total	**1,277,685**	**28,683**	**1,306,368**	**1,032,065**	**454,584**	**1,486,649**
	First Quarter of 1951			**Second Quarter of 1951**		
Bonds, Notes, and Debentures	238,634	9,866	248,500	221,600	.....	221,600
Preferred Stocks	23,660	.....	23,660	2,000	.....	2,000
Common Stocks	120,585	.....	120,585	106,104	.....	106,104
Total	**382,879**	**9,866**	**392,745**	**329,704**	.....	**329,704**
	Third Quarter of 1951			**Fourth Quarter of 1951**		
Bonds, Notes, and Debentures	78,000	.....	78,000	228,122	4,493	232,615
Preferred Stocks	2,324	.....	2,224	138,081	10,000	148,081
Common Stocks	36,984	4,154	41,138	81,691	170	81,861
Total	**117,308**	**4,154**	**121,362**	**447,894**	**14,663**	**462,557**

No Let Up in Prospect . . . With construction in 1952 estimated to exceed 1951 expenditures, no let up in financing is in prospect. It seems probable that the preferred stock route may have less appeal, with companies of medium quality now forced to pay over 5% for this type of money. There is some compensation in the good market for utility commons which should permit maintenance or improvement of capital structures without undue burden.

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Fluctuating Market Seen for Utility Securities

The 1952 market for utility securities may fluctuate between good and fair throughout the year. This is the picture presented during the Public Utility Round Table, Monday, Jan. 21, under sponsorship of Irving Trust Co and chairmanned by Tom P. Walker.

The group heard experts H. Everett Woodruff, vice president, New York Life Insurance Co; Frederick W. Page, vice president, Tri-Continental Corp; Duncan R. Linsley, chairman, Executive Committee, First Boston Corp; and Wesley Lindow, vice president, Irving Trust Co.

In general it was concluded that the market for common stocks might improve still further over the near term. Due to competition from other types of institutions, the bond market may be better in the second half of 1952 than the first half. No great improvement is looked for in preferred stock market over near term.

Prominent electric utility executives attending the round table included Henry B. Sargent, president, Central Arizona Light & Power Co; Ernest R. Acker, president, Central Hudson Gas & Electric Corp; Robert H. Knowlton, president, Connecticut Light & Power Co; Harold S. Sutton, treasurer, Consolidated Edison Co of New York, Inc; Stuart Cooper, president, Delaware Power & Light Co; Kenneth P. Applegate, president, Hartford Electric Light Co; F. D. Campbell, president, New England Gas and Electric Association; E. K. Higley, comptroller, Public Service Co of Oklahoma; Francis A. Keane, assistant comptroller, Public Service Electric & Gas Co; W. F. Stanley, vice president, Southwestern Public Service Co, and George R. Corey, vice president, Utah Power & Light Co.

YIELDS (%) Operating Electric Utility Securities

Quality	Bonds			Preferred Stocks			Common Stocks		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
DATE									
1952									
Jan. 24	2.95	3.00	3.15	4.24	4.35	4.79	5.34	5.90	6.53
Jan. 17	2.96	3.01	3.17	4.27	4.38	4.83	5.36	5.91	6.52
END OF QTR:									
4th 1951	3.02	3.07	3.21	4.39	4.50	4.91	5.42	6.18	6.84
3rd 1951	2.87	2.91	3.04	4.05	4.27	4.61	5.52	6.24	7.05
2nd 1951	3.02	3.11	3.23	4.11	3.37	4.68	5.73	6.38	7.78
1st 1951	2.87	2.93	3.00	3.96	4.19	4.52	5.47	6.20	7.13

Data: Reis & Chandler, Inc.

Electric Utility Earnings

(Preliminary)

Company	Period Months	Ended	Net Income 1951	1950	Earnings per Common Share 1951	1950
Arkansas P&L	12	Dec.	$4,668,327	$4,529,110	....	....
Consolidated Gas EL&P of Baltimore	12	Dec.	9,335,310	9,978,560	$1.69	$1.86
Consumers Power	12	Dec.	19,515,053	19,004,340	2.61a	2.78a
Louisiana P&L	12	Dec.	2,531,225	2,581,914	....	....
Minnesota P&L	12	Dec.	3,320,851	3,350,476	3.19	3.23
Mississippi P&L	12	Dec.	3,174,561	2,771,126	....	....
Niagara Mohawk Power	12	Dec.	20,721,000	19,857,000	2.05b	1.96
New York State E&G	12	Dec.	6,290,246	5,927,114	2.18a	2.30a
Ohio Edison	12	Dec.	13,887,228	14,379,458	2.60a	2.98a
Pacific G&E	12	Dec.	36,876,000	37,846,000	2.14c	2.62c
Pennsylvania Power	12	Dec.	1,794,345	1,644,921	....	....
Southern Indiana G&E	12	Dec.	1,668,300	1,870,916	1.86	2.13

a—On shares outstanding at end of each period; b—Not including the million shares of common stock issued on Dec. 28; c—On average number of shares during period.

Electric Utility Financing

Company and Description	Amount of Offering (000)	Offering Price	Yield to Public
WEEK OF JANUARY 24-30			
Bonds			
Central Illinois Public Service—1st mtg 3¼% 1982	$5,000	102%	3.27%
Dayton Power & Light—1st mtg 3¼% 1982	15,000	102.25%	3.13%
Common Stock			
West Penn Electric—440,000 (being offered to common holders on 1-for-8 basis, record Feb. 1 to expire Feb. 18)	$12,650	$28.75	6.96%
WEEK OF JANUARY 31-FEBRUARY 6			
Bonds			
Pennsylvania Power—1st mtg 1982	$6,000	.....	.....
Louisville Gas & Electric—1st mtg 1982	12,000	.....	.....
Nashville, Tenn.—electric power rev ref 1955-1971	2,500	.....	.....
Common Stock			
Kansas City Power & Light—317,792 sh (being offered to common holders on 1-for-6 basis, record Jan. 22 to expire Feb. 6)	$8,421	$26.50	6.04%
SCHEDULED FOR FEBRUARY-MARCH			
Bonds			Bid Date
Central Illinois Electric & Gas—1st mtg 1982	$4,000		Feb. 26
Central Power & Light—1st mtg	10,000		Mar. 4
Interstate Power—1st mtg	2,000		Mar. 18
Metropolitan Edison—1st mtg	7,800		Mar. 18
Oklahoma Gas & Electric—1st mtg 1982	12,000		.....
Los Angeles, Calif.—electric revenues	17,000		.....
Texas Power & Light—1st mtg	14,000		.....
Texas Power & Light—debentures	5,000		.....
Preferred Stock			
Pacific Gas & Electric—163,986 sh $25 par 5% 1st Series A (being offered to employees at 24½ of which 23½ is being paid through payroll deductions, to expire Feb. 8; no underwriting)	$4,099	$24.50	5.10%
Delaware Power & Light—50,000 sh	5,000		Feb. 26
Metropolitan Edison—40,000 sh $100 par	4,000		Mar. 18
Common Stock			
Southwestern Public Service—251,540 sh (being offered to common holders on 1-for-13 basis, record Jan. 30 to expire Feb. 14)	.....	.....	.....
Dayton Power & Light—256,007 sh (being offered to common holders on 1-for-9 basis, record Jan. 28 to expire Feb. 15)	$8,192	$32.00	6.25%
Maine Public Service—35,000 sh (to be offered to common holders on 1-for-5 basis, record about Feb. 4 to expire Feb. 25)	.....	.....	.....
Central Illinois Electric & Gas—64,000 sh (to be offered to common holders on 1-for-10 basis, record about Feb. 8 to expire Feb. 21)	.....	.....	.....
Interstate Power—350,000 sh	.....	.....	Mar. 18
Texas Utilities—400,000 sh	.....	.....	.....

FISH LADDERS such as this one at Rock Island Dam on the Columbia symbolize the dispute between power and fishery interests on the Deschutes farther upstream as . . .

Pelton Dam Is Held Vital

DPA issues certificate of necessity for Portland General Electric project on the Deschutes, runs into immediate opposition from area's fish and game groups

In spite of determined opposition by commercial and sports fishing interests, construction of the Pelton Dam on Deschutes River in central Oregon by Portland General Electric Co moved a step nearer realization when the Defense Production Administration certified the project as necessary to national defense.

Opponents of the project had hoped Secretary of the Interior Oscar L. Chapman, whose earlier statements had indicated an unfavorable attitude, would block issuance of a certificate of necessity.

Action Condemned . . . The action of DPA brought immediate condemnation from the dam's opponents. A statement by the Citizens' Committee to Stop the Pelton Dam, and endorsed by representatives of the Oregon Grange, CIO-Industrial Council, Izaak Walton League, Wild Life Federation, and the Columbia River Salmon and Tuna Packers Association, said:

"The chief reason PGE wants to build this relatively small dam is to gain a bargaining position with the Bonneville Power Administration. Then it can continue to buy electricity which it can turn around and resell to the very taxpayers who indirectly are buying the dam for PGE."

The statement noted that BPA, Federal Power Commission, and other federal agencies in 1947 approved an area plan to leave Columbia River tributaries below McNary Dam free from obstructions to develop their maximum fisheries potential, and accused BPA and FPC of reversing themselves.

PGE Denies Charge . . . PGE hotly denied the charge that its purpose in building the dam is to gain a bargaining position with Bonneville contending BPA endorsed the project.

Coming to the defense of DPA's action was the Oregon Farm Bureau Federation which consistently has supported the Pelton project. Its statement declares that a careful investigation reveals claims of harmful effects on the fish industry are not justified; that on the contrary its own members who are fishermen maintain that sports fishing actually will be improved by the project. It also recalls that the Oregon legislature at its last session refused to declare the Deschutes River a fish sanctuary. The bureau also advocated use of private capital to develop the country's resources.

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Procedure for Charging CMP Orders Changed

Quarterly cut-off requirement for delivery of controlled materials has been removed, but the problem of procurement still remains.

Prior to the change Jan. 5, utilities were required to obtain new allotments if shipments of controlled materials were delayed beyond the quarter covered by the allotment attached to their order.

Now utilities are not required to charge their allotment for the quarter during which shipment on such carry-over orders is actually made. However, Defense Electric Power Administration points out this does not make it mandatory on controlled material producers to accept all authorized orders in the quarter requested.

After a producer has accepted orders up to the amount of his authorized production schedule, he must reject further orders. Removal of the cut-off requirement covers only orders actually accepted by a producer.

If, because of unforeseen difficulties, the order cannot be shipped during the quarter for which it was requested, the producer is to ship it as soon as possible without requiring an additional allotment from the purchaser.

The change does make it mandatory for the producer to schedule shipment of these carry-over orders in preference to any order which was originally scheduled for a later date.

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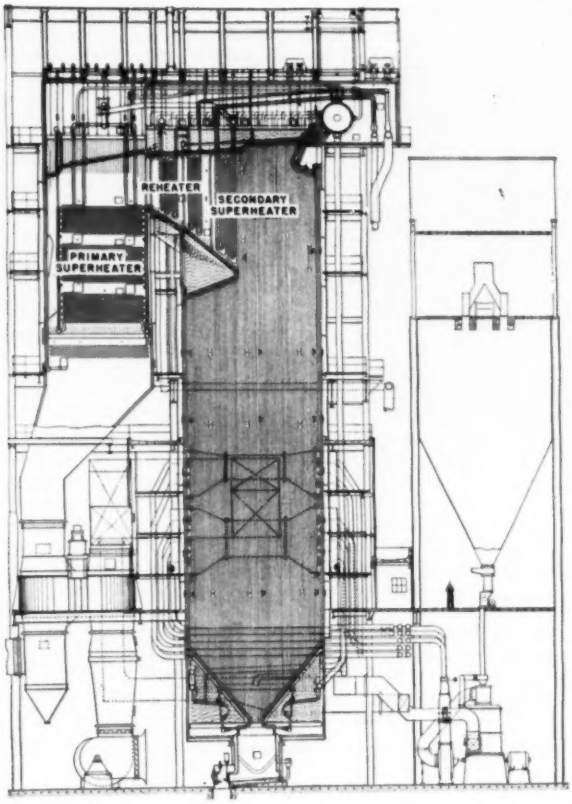
Contract Decision Upheld

United States Court of Appeals has upheld a Maryland Federal Court decision invalidating a 1931 power contract between Pennsylvania Water & Power Co, Consolidated Gas, Electric Light & Power Co of Baltimore, and Safe Harbor Water & Power Co. The court ruled that the contract gave Penn Water and Consolidated absolute power to restrict Safe Harbor in the sale of electric power to other users and in the installation of additional equipment.

C-E REHEAT BOILERS

JOPPA STEAM STATION

ELECTRIC ENERGY, INC.



THE C-E Unit, illustrated here, is one of four such units now in process of fabrication for Electric Energy, Inc., near Joppa, Illinois.

Each of these units is designed to serve a 125,000/156,000 kw turbine-generator operating at a throttle pressure of 1800 psi with a primary steam temperature of 1050 F, reheated to 1000 F.

The units are of the radiant type with a reheater section located between the primary and secondary superheater surfaces. Economizer surface is located below the rear superheater section and regenerative-type air heaters follow the economizer surface.

The furnaces are fully water cooled using closely spaced tubes. They are of the basket-bottom type, discharging to sluicing ash hoppers.

Pulverized coal firing is employed, using bowl mills and tilting, tangential burners. Provision is made to use oil and natural gas as alternate fuels. B-544

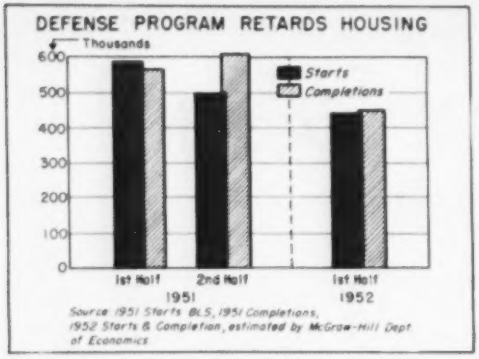
C-E

COMBUSTION ENGINEERING—SUPERHEATER, INC.

200 Madison Avenue • New York 16, N. Y.

ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS

ELECTRICAL BUSINESS OUTLOOK



Construction in 1952..

. . . will continue at near record levels in spite of cutbacks of non-defense building

Volume of new construction will be down in 1952—cutback by shortages of copper and structural steel. A big drop in non-defense building will more than offset substantial increase in defense and related construction.

Full size of the construction cutback won't show up in dollar figures. Increasing costs are expected to add 4 to 5% to dollar totals for the year. The drop in physical volume—partly concealed by this inflation—may amount to 10 % or more.

But construction will continue at near-record levels, despite this cutback. The expected dollar volume of $27.5-$28 billion has been surpassed only in 1951 and possibly 1950. And physical volume—with price changes taken out—will probably be the fifth highest in history, surpassed only in 1926, 1927, 1950, and 1951.

Private construction gets the big cuts . . . Total private construction may be as much as 20% below last year's $20.8 billion. The cutback will fall heaviest on housing, commercial and recreational building, and other types of construction classed as "non-essential" in a mobilization economy.

Biggest cutback will be in housing. Government officials expect reduced allocations of copper to slash housing starts to 600,000-700,000—35 to 40% below 1951, and only about half the number in the peak year of 1950. The drop in starts last year is already showing up in a sharply lower volume of completions.

Starts won't fall as low as government officials say. Builders will use substitutes, change basic designs, build smaller houses—and probaly start 800,000 or more new housing units in 1952. But the total of completions will still be substantially lower than in 1951.

Commercial building is also hit hard by shortages. Some work will continue in areas where new stores and warehouses are badly needed. But total work will be cut 50% or more below last year's $1.3 billion. The cutback is already taking effect. Commercial building in December was 50% below December, 1950.

A further rise in industrial building will make up for part of the cuts in other private building, as industry continues its record program of expansion. Industrial work reached a new high of nearly $2 billion last year, should beat that by 10% or so in 1952.

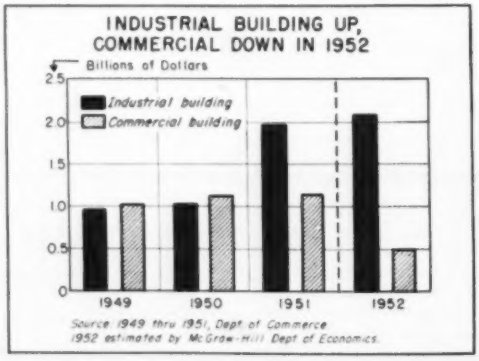
Public work takes up some slack . . . Volume of public construction will be much higher this year. The total may rise by 14%-15%, with military and Atomic Energy projects supplying most of the increase.

Military and naval construction—over $1 billion last year—may be 150% greater in 1952. Public industrial construction, mostly for Atomic Energy, will go up another 80 to 100%. It increased by 293% last year, to a total of almost $900 million.

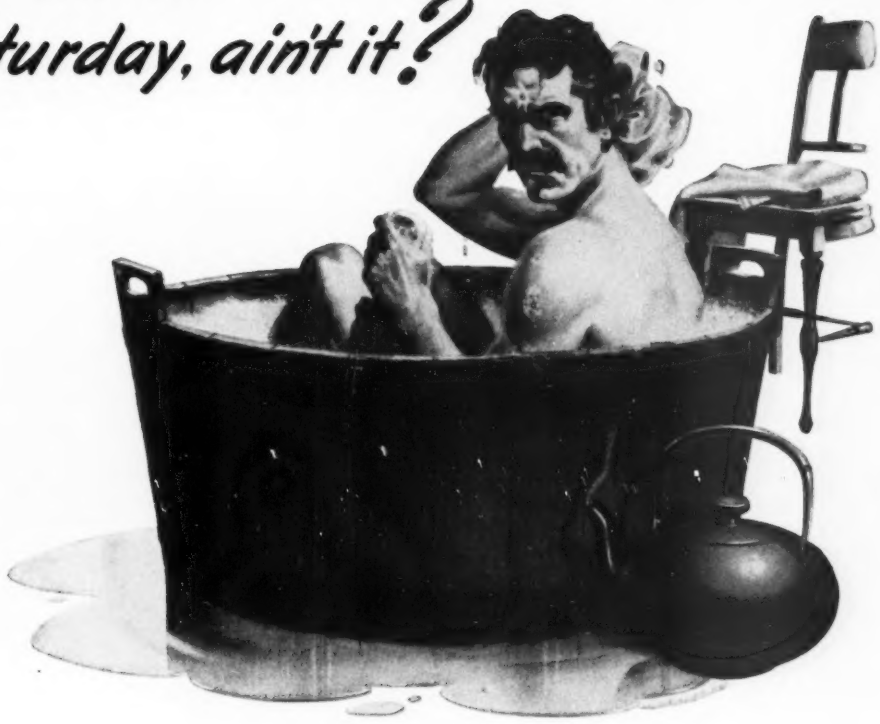
Some cuts in public construction are also in prospect. Work on dams, administrative buildings, sewers, and other projects that can safely be postponed will be held up until more materials are available. School building and highway construction are expected to be about the same as they were last year.

Outlook for future construction . . . The volume of construction is expected to increase in 1953. Military and Atomic Energy work will still be at high levels. And, with more materials available, builders expect to start work on non-defense construction now being held up by shortages. Industrial building will be slipping by 1953. But the rise in commercial building will more than take up the slack. Commercial building still has not caught up with the big postwar growth in population. The cutback this year will make demand for new buildings even greater in 1953.

There's no agreement among experts about housing volume next year. But a good many experts think the U. S. will need one million new houses each year for some time to come. A return to that level of building, or even a higher level, is likely once the copper shortage is eased.



Well, it's Saturday, ain't it?



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